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WEEK . . .

ours Sees Bottom Installed Largest Open-Hearth Furnace

Ford Stamps Lamp Parts

rectly Designed Jigs, Fixtures an Cut Welding Costs

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STEEL

The Magazine of Metalworking and Metalproducing

VOL. 125, NO. 21 — NOVEMBER 21, 1949

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AFTERMATH OF THE STEEL STRIK

DEPENDABLE DAN
OUR CUSTOMERS' MAN

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November 21, 1949

The Acid Test

Fair dealers are marshalling their forces for a new attack upon corporate bigness. Next year we will witness renewed efforts on the part of the Department of Justice, Federal Trade Commission and Congress to disintegrate large industrial giants and to discourage consolidations.

Proponents of this campaign state their objectives more frankly than did their predecessors. There was a time when trust-busting activity was based upon real or alleged evidence of violation of antitrust laws. Today there is a disposition in Washington to attack bigness on the ground that mere bigness in itself is harmful to the public interest. The argument is that a business giant enjoys monopolistic powers by virtue of its size and that it can stifle competition by buying out competitors. Today the attackers of bigness declare that their primary objective is to preserve opportunity for small businesses.

This avowed solicitude for the little fellow should be taken with a grain of salt. Some fair dealers who yell loudest on behalf of the oppressed small businessman consistently vote for tax and other laws which virtually force him to sell out to big competitors if he is to preserve any considerable part of his estate for himself or his heirs. In many cases the small entrepreneur is more at the mercy of bigness in government than he is at the mercy of bigness in private enterprise.

It may prove to be fortunate that the fair dealers selected Great Atlantic & Pacific Tea Co. as one of their guinea pig attacks against bigness. A & P food stores are close to the buying public. Housewives resent the Justice Department's suit to split A & P into smaller units. Small competitors are aligning themselves with A & P against the government's charges. Airing this controversy in full view of the public will acquaint the man in the street with the pros and cons of the bigness issue.

There is an object lesson in this A & P experience for the management of gigantic industrial corporations. Management may well ask: "If we were sued as A & P has been, would our customers and small competitors support us as fervently as are A & P's customers and competitors?" This would be an acid test as to whether bigness is beneficial or harmful.

* * *

DETHRONING KING COAL: The Taft-Hartley law may be invoked against John L. Lewis and the United Mine Workers if the miners quit the pits again on Nov. 30. President Truman now says he will not hesitate to use the law's injunction features.

Meanwhile evidence is piling up to show the short and long term results of the Lewis dictatorship. Aside from the hardships inflicted upon the miners themselves, the futile strike has caused a serious deficit in coal stocks in the northwestern areas normally served by lake shipping. The pressure for coal at upper lake ports may cause vessel operators to carry coal up the lakes and return light—an unusual and uneconomical operation. In any event, a considerable tonnage of coal will have to go northwest by rail, at higher cost to consumers.

A longer term result of Lewis czarism is found in the steady shift from coal to oil and gas. In 1939, coal supplied 51 per cent of the energy in the nation and oil, gas and water power supplied the remaining 49 per cent. In 1948 coal accounted for 46.6 per cent and oil, gas and water power 53.4 per cent.

Coal is one of our most abundant resources.

(OVER)

Destroying its market is not the way to help the miners, operators or the public. Some day, when we enjoy better leadership in government, mine unions and mine operation, we will wonder why one man was permitted to wreak so much havoc. —pp. 53, 55, 64

* * *

FLEXIBILITY OF MESABI: In view of current interest in future iron ore supplies, the article on "Iron Ore, Its Mining, Beneficiation and Reserves," beginning in this issue is particularly timely. The author is E. W. Davis, director of the Mines Experiment Station of the University of Minnesota. His long association with iron ore problems in important capacities makes him an outstanding authority on the subject.

An interesting point brought out in the first installment is the flexibility which the Mesabi range affords the steel industry. Open pit mining is ideally adapted to violent fluctuations in demand. With the approach of the late war production was increased from 13 million to 70 million tons in four years "without any fuss, commotion or government subsidy."

To double output of the great Mesabi pits it is only necessary to employ a few more shovels and men. Whereas 5000 men got out 13 million tons in 1938, only 11,000 men were required to produce 70 million tons in 1942. —p. 96

* * *

AUTOS PACE BUSINESS: A novel characteristic of the first half of the present fourth quarter is the extent—perhaps unprecedented—to which automobile manufacturing bolstered the economies of most of the world's most highly industrialized nations.

In the United States since Oct. 1 automobile and truck output has continued at fairly high levels, while the steel, coal and transportation industries were badly crippled by strikes. In western Europe, where steel output has been declining in France, Belgium and Western Germany, automobile manufacturing is clearly the leading activity. Output of passenger cars and commercial vehicles in France in September this year was 26,674, compared with 18,950 in September, 1938. In Western Germany output of the Volkswagen in October totaled 4878 and a new car is being designed to sell at $600, against the $1050 to $1300 domestic price for the Volkswagen. In Great Britain, the export of British cars continues so brisk that few units are available for the domestic market. —pp. 63, 67

* * *

MAN'S SPIRITUAL NEEDS: What does the employee really want? At the production conference of the American Management Association in Chicago, Denton K. Swartwout, president of the Swartwout Co., answered this question by citing these five wants: 1. Fair and just wages, 2. opportunity to utilize his skills to their fullest, 3. security, 4. recognition and 5. a sense of participation.

Recently emphasis has been placed chiefly upon wants 1 and 3. Union leaders consistently work hardest for the tangibles, such as compensation. Perhaps a thorough study of what employees want would show that the intangibles 2, 4 and 5—if made available, would evoke a much more enthusiastic response by employees than would liberal grants of the tangibles.

Possibly we have been so obsessed with the material wants of the individual that we have grossly underestimated the importance of his spiritual needs. —p. 58

* * *

O. K. MORE CONSTRUCTION: Outlook for the construction industry is bright. The upswing in building activity which started in August has gained enough momentum to push contract awards in 37 states east of the Rocky mountains reported to F. W. Dodge Corp. in October to $1,061,751,000—third highest monthly volume in the Dodge statistical series dating back to the twenties.

On Nov. 8 voters authorized more than $1.5 billion of additional state and local government spending, most of which will go into construction projects. These authorizations, piled on top of the $8.4 billion of contracts awarded during the first 10 months of 1949, should insure a healthy volume of business for months ahead to metalworking companies which serve the construction industry.

Activity in all major classifications of building and engineering works, for private as well as public account, was reflected in the October reports. The voters' authorizations will accentuate the gains in schools, hospitals and institutional buildings. —p. 57

E. L. Shaner

EDITOR-IN-CHIEF

News Summary

STRIKE WOUNDS— Don't expect the wounds from the steel strike to heal overnight (p. 53). Effects will be felt in varying degrees for months to come. The momentum of the business upswing may be lost for it will take at least six months to make up steel production. Automakers will lose three weeks' output because of supply dislocations. Appliance makers are moving back toward capacity operations but many lost at least a week's production. And then there remains the coal problem, which President Truman has in his lap now.

COAL SHIPPING— The President isn't the only one with a coal difficulty. Great Lakes vessel operators (p. 55) are trying to move 4 million tons of the fuel to upper lake ports before the weather gets bad. The strike and short work weeks in the coal mines have created a shortage in the ore country. Lake ships may go up loaded and come back light, reversing the usual procedure because ore shipping will stop when it freezes.

FUEL CONVERSION— More and more Americans are converting to oil and gas to heat their homes (p. 64). Use of coal as a domestic fuel has increased 24 per cent since 1939, oil 135 per cent, gas 136 per cent. But coal still is far ahead; it has 67.1 per cent of the household market. Supply outlook for oil and gas this winter is the best since the war.

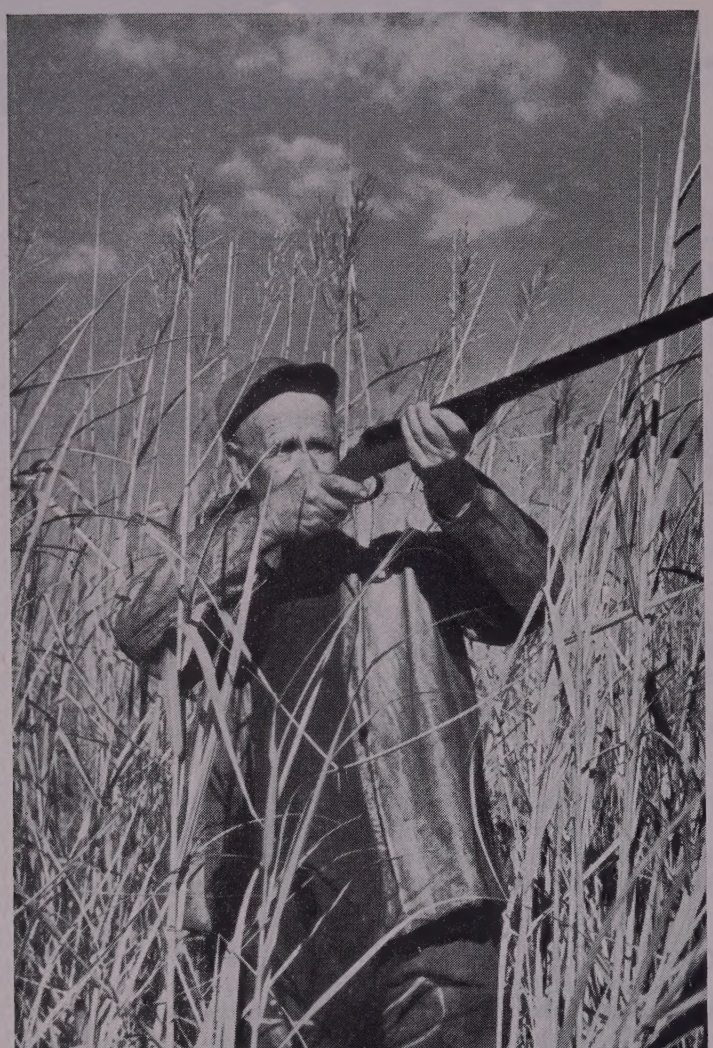
CONSTRUCTION—Look for strong demand for building products (p. 57). The construction upswing which started in August soared in October to the third highest peak on record. Public building will be high. Architects are urging clients to award their contracts quickly to beat a possible cost rise.

BUSINESS VOICE IN WASHINGTON—You have reason to be alarmed at the progressively fainter voice which represents business in Washington (p. 60). Labor and farm interests have highly vocal representation. Industry spokesmen have difficulty in making themselves heard. They must buck the President's antibusiness policy and the fact that many areas of government activity affecting business like monopoly prosecution and tariffs are shepherded by different departments.

AUTOS IN THE U. S.— The American automobile market is still excellent. General Motors President C. E. Wilson says "the basic market is as much as 25 per cent greater than it was before the war." Handsome GM dividends support this (p. 68). A Federal Reserve Board study finds that consumers are better able to own cars today than in 1941. The upper 80 per cent of the nation's income scale will sustain "a continued high level of sales" to mid-1950.

AUTOS IN EUROPE—As in the United States, the automotive industry sets the economic pace in Western Europe (p. 63). British exports are so heavy that the domestic market has barely been scratched. France is entrenched as the third largest world producer. The Germans are designing a $600 vehicle . . The British Labor government will not take over steel industry ownership until the fall of next year or well after the general election to be held before July 1. Conservatives promise to void nationalization if they win.

HERE AND THERE IN INDUSTRY—Republic Steel Corp. has lighted a new 38-coke oven battery at Warren, O. (p. 58) . . . Austin Co. has begun work on the new A. O. Smith Corp. of Texas pipe mill in Houston (p. 70) . . . U. S. Steel Corp. has an investment of $8000 per employee, but this should be higher (p. 56) . . . Quality control can cut costs, American Management Association heard (p. 58) . . . .The U. S. gave $5169 million to foreign countries in fiscal 1949 (p. 57) . . . The federal government is making regular payments to 14,187,000 of its citizens either as employees or beneficiaries under various acts of Congress (p. 60).



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STEEL
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And Now To Heal Strike Wounds

Many metalworking companies still face curtailments due to depleted inventories. Several weeks will be required to balance stocks. Steel production recovering

STEEL mill operations are heading ward the prestrike rate, but the ounds caused by the stoppage to any metalworking companies will t be healed this year.

Ingot production last week is es- nated at 56 per cent of capacity. his week will witness further re- very and early in December the 85 r cent operations prevailing before e walkout will be equaled or sur- ssed.

Steel consumers who operated at rmal or slightly curtailed levels dur- g most of the strike now have badly pleted inventories. Several weeks ll be required to rebuild and bal- ce stocks to a practical working vel.

Some will have to curtail further shut down entirely.

Auto Industry Loses Three Weeks—Automakers stocked as much steel possible during August and Sep- nber in anticipation of the strike. ocks now are far below normal d plants are being shut down on a olesale basis. Few automakers ex- ct large-scale production before the n of the year.

Other fabricators are in a similar sition. Those which were not closed strike have used up or cut deeply o their inventories.

New Coal Strike?—While steel mill erators struggle to regain high-level erations, they are keeping on eye the maneuvers of the government, l mine operators and John L. Lew- Should Mr. Lewis call out his ners again Dec. 1, many mills uld have to curtail for lack of l almost as soon as their opera- ns have recovered to the prestrike e.

Momentum Lost—Meanwhile, econ- ists are arguing whether the steel l coal strikes will stunt the recov- evident last fall. Some believe the s in purchasing power resulting m wages never paid and from alth never produced may have a ressing effect on the national nomy for months, possibly into second half of 1950.

The more optimistic argue that the ses can be made up over six or e months by raising operations over the prestrike level. Near-capacity production, full work-weeks could at least partially amortize the losses of October.

Coal Dispute in President's Lap

How to avert a new coal strike Dec. 1 is President Truman's problem now. Federal Mediator Cyrus Ching dumped it into the Chief Executive's lap. "Further mediation efforts at this time would be fruitless," Mr. Ching advises Dr. John R. Steelman, the President's labor adviser.

The White House late last week was studying the problem.

President Truman says he plans no action outside the Taft-Hartley act and says he is not yet ready to use that law's emergency procedure. He says he will not hesitate to invoke the strike-halting injunction features of Taft-Hartley if an emergency develops.

The President's statement lead to speculation that he will take no action until the Nov. 30 deadline approaches or possibly until the miners leave the pits again. He says he will not propose a voluntary fact-finding board similar to that employed in the steel dispute.

Christmas Is Coming—Coal miners are less enthusiastic in their support of Mr. Lewis than they have been in the past. Before they were told to return to work 12 days ago, they were grumbling about the loss of wages. Some had started back-to-work movements. A new strike, coming just a few weeks before Christmas, would be even more unwelcome than the stoppage just ended.

Mr. Lewis knows the temper of his members.

Some Hunger for Steel

No disastrous famine in steel supplies threatens, but many consumers will be on lean diet for some time.

Hunger pains are hitting most sharply the large users like auto producers and small consumers who depend upon warehouses. Warehouses, which provide about 17 per cent of all the steel used annually, have low inventories and in some areas have nothing in sheets, strip and bars. Although steelworkers are back, are producing at 56 per cent of capacity now and will soon be operating at prestrike rates or better, layoffs are increasing among steel users.

50,000 Autoworkers Idle — More than 50,000 employees are or will be laid off in the auto industry. Willys, along with Lincoln, closed Nov. 11. Other Ford divisions will continue through the month but will

WHAT TO DO ABOUT THAT MAN LEWIS
. . . bothers Mediator Ching and Presidential Adviser Steelman

get only 13 days in December. Nash suspended at the end of last week. Most General Motors divisions expect to halt production Nov. 23, resuming with small-scale new model output in December. GM President C. E. Wilson says the strike cost his company three weeks' output although it had stockpiled the metal last summer for just such an emergency. Packard will shut down Nov. 23 for the rest of the year. Studebaker expects to suspend Nov. 28 but hopes to resume Dec. 12. All Chrysler divisions but Plymouth have curtailed but not completely stopped operations. Plymouth's changeover for new models will start Nov. 26.

Small companies hit by short warehouse supplies range from stampers to specialty product firms. Many of these have not closed down altogether, but are on a reduced work week.

Appliances Hit—Appliance makers have been widely affected. General Electric Co.'s Erie, Pa., refrigerator plant had to close. Thor Corp. shut its Chicago washer plant Oct. 31 but will be able to resume full production Nov. 21.

Among the farm equipment makers, Allis-Chalmers is recalling 2100 to resume tractor output Nov. 28.

The tightest supply situation is past in those industries in which the major steel companies have capacity. In bolts and nuts, for example, steel firms with fastener production can start supplying the market soon even though independents run short.

Cans, Construction Unaffected — Not yet seriously affected is the construction industry which had large steel inventories. American Can Co. has had no loss of sales because of the steel walkout and should end the year with a volume ahead of the $409 million in 1948 sales.

How Big a Victory?

The pension "victory" of the United Steelworkers-CIO may not be as one-sided as first appeared. Although the large majority now have won "noncontributory" $100 monthly pensions at 65 after 25 years of service, these pensions all include federal social security benefits.

Workers now contribute 1 per cent of their wages up to $3000 annually for social security.

H. R. 6000, approved by the House and awaiting action in the Senate in 1950 broadens the wage base to $3600, ups the tax to 1½ per cent and provides for further increases up to a maximum of 3¼ per cent by 1970. If this bill is passed, workers will contribute substantially more toward social security, will receive no greater benefits, unless social security benefits exceed their company pensions.

The expense to employers would be correspondingly decreased, as the workers' contributions increase.

Organized labor has been a strong advocate of social security expansion. Will they now reverse their stand?

—Christmas Housewares—

THE STEEL strike will have little effect on the Christmas housewares and small appliances business. So says James W. Alsdorf, president of the National Housewares Manufacturers Association.

Signs indicate that the coming Christmas retail business will probably equal—if not exceed—Christmas, 1948, which was the best year in the industry's history. Retailers had already placed their Christmas stock orders with manufacturers when the strike began. Production on these orders ends by Nov. 30. Most producers of housewares and small appliances have enough steel to operate near capacity until that time.

"Production affected by the strike," says Mr. Alsdorf, "will be in those goods manufactured for the post-Christmas business done through January to the middle of February. That volume is always the slowest of the year for us."

84-Day Strike Ends

Ending an 84-day strike, about 2000 CIO miners in the Coeur d'Alene silver and lead district of Idaho went back to work last week, permitting many mine and smelter operations to get underway.

Contract talks had been pretty much stymied since June 30 over a health and welfare program. New contract under which the employees went back to work is said to be a compromise, with employers and miners contributing equally to a medical program that protects miners and their families while they are off the job. Separate provisions already in effect covered the miners at work.

Wage scales remain unchanged but the new contract provides for a six-day work week. Most major operations in the district put their properties on a five-day week early this year when the price of lead dropped to a new postwar low. A new clause calls for reopening of the contract for wage discussions if mine owners abandon the six-day week.

Copper Mining Resumes

Production is under way again Anaconda Copper Mining Co.'s E mont copper mine, Butte, Mont., f lowing a suspension that came Ju 6 with a sharp drop in demand a price. In recent months demand the metal has increased and the pr has made some recovery.

Anaconda also is resuming dev opment work at its Greater Bu mine project.

Urges Flexible Pensions

Pensions flexible enough to p mit workers to change jobs with losing their benefits rights are ad cated by C. E. Wilson, General M tors president.

Mr. Wilson also believes pens benefits should reflect the change the purchasing power of the doll Social security benefits have b made inadequate by the decline the value of the dollar since the pr ent schedule of benefits was set

"Adequate federal pensions op ated on a sound basis would seem be the real answer to the problem Mr. Wilson says.

Rescind Salary Cuts

Salaried workers of Jones & Lau lin Steel Corp. won't have to t the pay cut ordered while the s and coal strikes were in effect. 20 per cent reductions were to come effective Nov. 1. As the m resumed production, management considered the order, decided to full salaries.

Lewis, Union Pay Fines

John L. Lewis and the Uni Mine Workers last week paid $1,4 000 in contempt fines to the Uni States government—their penalty failing to obey a court order to the 1948 coal strike. The fine is lieved the largest ever paid by labor union.

Republic Shutdown Again

More than 400 employees of Rep lic Steel Corp.'s Youngstown pl are again out of work.

Here's how it happened: Ele of 15 Republic open hearths were operation, the largest number si work was resumed. Four charg machines are put into operation w 12 or more furnaces are in operati three were being used. A 12th f nace was being readied for prod tion pending completion of repairs a fourth charging machine. charging machine operators wan a fourth charging machine opera to work. The company declined, the men walked out.

Shutdown of the rolling mills follow as the steel supply runs

ccent on Coal in Lake Shipping

Special insurance coverage established for vessels through December, as vessel operators are asked to move 4 million tons of fuel. Rates up. Ships may go down lakes light

W to move several million tons of l to upper lake ports before wear forces a closing of Great Lakes pping is bothering vessel operators se days.

ohn L. Lewis' 52-day coal strike, ceded by a period of short work-ks, have created a deficit in coal plies in the northwestern areas mally served by lake shipping. ne shippers estimate the post-ke coal movement on the lakes 4 million tons, although they are at all certain that this tonnage be moved.

igher Rates Offered—Coal ship-s are offering higher rates to ves-operators for carrying coal up the es. Going rates are up about 50 cent over the summer rates, le one coal company is reportedly ering double rates to operators o will carry coal up the lakes and urn light.

pecial insurance coverage has n set up for the period from c. 12 through Dec. 31 in recogni-n of the critical need for coal. es for late December insurance erage are so high that they almost wipe out the advantage of the higher freight rates. One vessel operator estimates higher insurance rates on a 13,000 ton vessel would up operating costs $400 a day.

Car Shortage Seen—Few shippers believe that vessels will be able to carry all the coal needed to upper lake ports. This will mean a freight car shortage during the winter as coal not shipped by vessel will be diverted to the railroads.

Many of the independent vessel operators already have loaded storage grain and will not re-enter the shipping trade this fall. The fleets controlled by the larger steel companies are concentrating their efforts on hauling down special grades of iron ore needed to balance out their stocks. Shipping companies whose primary interest is in coal are keeping their vessels in operation and some may operate through December, if weather permits.

Ore Stocks Fair—Although the steel and ore mine strikes cut sharply into iron ore shipments in October and early November, steelmakers are not too concerned over winter stockpiles. While shipments were reduced by the strikes, consumption was also cut.

Ore men believe that stocks at furnaces and docks will be adequate to carry the furnaces through to the opening of the 1950 season. Some swapping of needed grades may be necessary next spring.

Stocks of iron ore on hand Oct. 1 totaled 45 million gross tons, compared with 41 million tons on the same date last year.

Shipments for the season to Nov. 14 totaled 68,446,744 gross tons, compared with 78,929,532 tons to Nov. 14, 1948, indicating a decrease of about 10.5 million tons. Ore shippers say the movement over the remainder of the season may not exceed 300,000 tons.

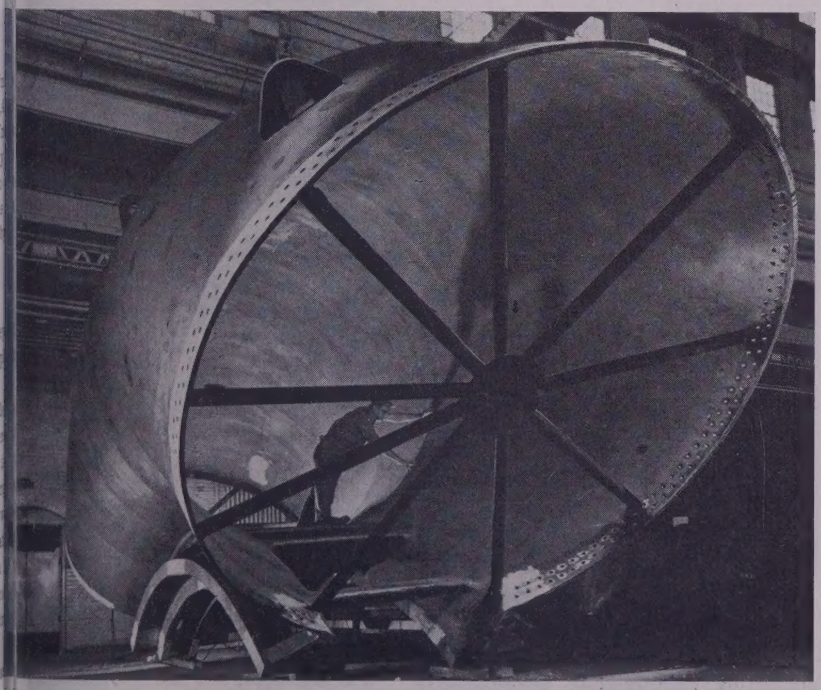
All Shipments Down—Caught between the steel and coal strikes, most of the lake carriers rode at anchor or were moored at docks during all of October. Vessels that continued operations were able to move only 3,973,760 net tons of ore, coal and grain, says the Lake Carriers Association. Grain was the only bright spot and accounted for a greater tonnage than either ore or coal.

Movement of the three major commodities in October (net tons):

	1949	1948
Iron ore	1,763,791	11,232,007
Coal	414,995	6,580,242
Grain	1,794,974	1,621,759
Total	3,973,760	19,434,008

Cumulative shipments for the season to Nov. 1 (net tons):

	1949	1948
Iron ore	76,476,268	84,220,665
Coal	31,015,925	47,133,784
Grain	10,362,262	6,659,493
Total	117,854,455	138,013,942



Q: BULL SHOALS DEVELOPMENT: This plate steel, all-welded spiral casing ion for the first of three 62,000-hp, 190-ft head, 128.6-rpm hydraulic tur-es for the Army Department's Corps of Engineers at Bull Shoals, near Amos, ., is being fabricated in Allis-Chalmers shops. It weighs over 50,000 pounds. Diameter of the casing inlet is 14 ft, 8 in.

Merchant Fleet at Postwar Peak

AMERICA'S privately owned merchant fleet reached a postwar peak on Nov. 1 with 1206 ocean-going vessels over 1000 gross tons in size. National Federation of American Shipping says these ships aggregate 14,268,000 deadweight tons.

The national defense reserve fleet, maintained by the Maritime Commission totaled 2056 ships on Nov. 1. Tugs, cableships and military auxiliaries were not included in the reserve fleet total.

Of the active private fleet, 735 were passenger liners, combination cargo and passenger ships or freighters, aggreagating 7,363,000 tons. Oil tankers numbered 471 ships of 6,905,000 tons.

$8000 Per Employee

Invested by U. S. Steel but expenditures for production tools should be higher

UNITED STATES Steel Corp. has invested more than $8000 in its business for each employee on its payrolls.

This investment in production tools should be even higher, says Charles R. Cox, president of Carnegie-Illinois Steel Corp., a U. S. Steel subsidiary, who spoke before the National Electrical Manufacturers Association in Atlantic City, N. J.

Even though the country maintains an amazing productive capacity, Mr. Cox believes the war caused us to accumulate "an estimated theoretical deficit of some $80 billion worth of plants and equipment that would have existed if our previous rate of industrial expansion had continued unchanged during the last 20 years." The best way to overcome this deficit is through the accumulation and productive investment of savings.

Government policies and the economic conditions have not encouraged such savings, and the nation's industrial capacity deficit is in danger of growing larger. Mr. Cox makes these recommendations to stem the tide: End of deficit operations by the government; overhaul of the federal tax laws; clearer definition of trade regulation authority of government agencies; regulation of labor as well as business monopolies; government encouragement of private capital investment.

September Inventories Up

TOTAL business inventories at the end of September amounted to $54.8 billion, says the Office of Business Economics, U. S. Department of Commerce.

After adjustment for seasonal fluctuations, the book value of inventories in September was $150 million above the August level—the first monthly increase since the alltime peak was reached in November, 1948. The September increase was concentrated in wholesale and retail trade as manufacturers' inventories declined almost $500 million.

About one-third of the total increase was in stocks held by motor vehicle dealers.

Income Slides in September

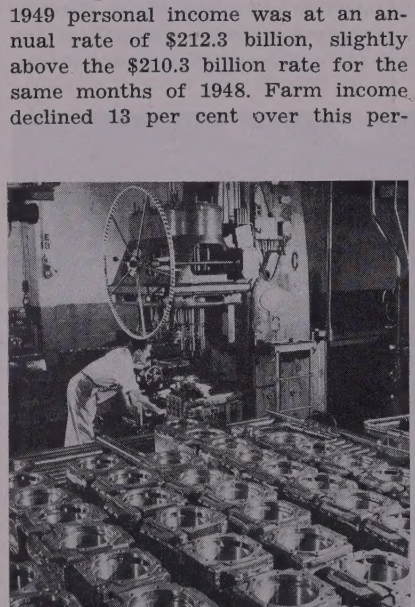
PERSONAL income in September was at an annual rate of $210.8 billion, compared with $211.4 billion in August, says the Office of Business Economics, U. S. Department of Commerce.

Nonagricultural income increased at an annual rate of $1 billion and was higher in September than in any previous month of 1949. The increase in nonagricultural income was more than offset by a reduction in farm income.

Wage and salary receipts were at an annual rate of $134.7 billion in September, slightly higher than in the previous month. The increase was limited by work stoppages in coal. Manufacturing wages and salaries rose by about $1 billion, at an annual rate. That shows increased employment and a lengthened work week. It was the first appreciable gain in manufacturing payrolls this year. Factory wages in the nondurable goods industries — continuing the steady rise which began last April —advanced in September almost to the high level reached in late 1948. In the durable goods industries, payrolls also rose from August to September but in the latter month were still considerably below the total for any month of 1948.

Dividend disbursements increased slightly in September and for the first nine months of 1949 were 6 per cent above the total for the same period of 1948.

During the first nine months of 1949 personal income was at an annual rate of $212.3 billion, slightly above the $210.3 billion rate for the same months of 1948. Farm income declined 13 per cent over this period. Nonfarm incomes for the t quarters was at an annual rat $192 billion, about $5 billion a the rate for the corresponding pe of 1948.



KNEE ACTION HORIZONTALLY: To give travelers on the Union Pacific Railroad more comfortable rides, SKF Industries, Philadelphia, developed a new antifriction bearing which cushions vibrations by giving axles greater lateral freedom so wheels can "ride with the punch." Here are the journal boxes that enclose bearings

Packaging Officers Elected

R. C. SELL is the new presiden the Society of Industrial Packa and Materials Handling Engin for 1950 and 1951. He is gen traffic manager of Koehring Co., waukee.

Paul O. Vogt of General Ele Co., Schenectady, N. Y., becomes chairman of the board. R. F. W of International Harvester Co., cago, continues as chairman of board. The new executive vice p dent is Stanley Price of Wes Electric Co., Chicago. These three regional vice presidents: W. Go Bennett of Anaconda Copper Mi Co., New York, for the East; J Singer of National Container C Columbus, O., for the Midwest; Gale C. Cunningham of North erican Aviation Inc., Los Angeles, the West. J. L. Ware of Sears, buck & Co., Chicago, continues treasurer. H. E. Brill of Mid-St Container Corp. is the new secret

Galvanizing Company Formed

NEWLY organized Boyles Gal izing Co., Tulsa, Okla., is in op tion, says W. M. Boyles, president

The plant will employ 50 to ha galvanizing jobs, mostly for cust ers in the mid-continent area. cluded in Boyles' equipment is overhead crane and a galvani kettle more than 30 ft in length a zinc capacity of 100 tons. A f year old building purchased f National Tank Co. will house processing activities.

Portsmouth Sale Approved

PORTSMOUTH Steel Corp. sh holders approve sale of the c pany's physical assets to Det Steel Corp. for cash and Det Steel common stock, says El Schwartz, president.

Portsmouth reports earnings first nine months of 1949 tot $4,303,973, compared with $3,040 for like 1948 period.

Freighter To Be Converted

COLUMBIA Transportation Cleveland, will convert its freighter, the *W. C. Richardson* a crane-equipped self loader-unlo Conversion will be made this wi at the South Chicago yard of American Shipbuilding Co. It be the fifth self loader for Colun which operates 17 lake vessels.

RN SQUEEZE: As fast as new government corn storage bins are available are filled with some of the 1948 crop being received by the Commodity dit Corp. in payment for loans made to farmers on last year's crop. When ers for storage capacity of 280 million bushels were placed last summer, 60 per cent of storage bins were to be made of steel

Gave $5169 Million in 1949

S. GOVERNMENT gave $5169 ion to foreign countries in fiscal .

he money went as gifts or other ts under various foreign-assist- programs. The figure was al- t double the $2693 million for the ious year, Commerce Depart- t's Office of Business Economics rts.

otal of such grants from July 1, , to July 1, 1949, is $13,260 mil- says OBE's Clearing Office for eign Transactions. These gifts grants are provided as outright itions of the U. S. government or indeterminate conditions and s of recovery to the U. S. pend- future settlements. Assistance Germany and Japan will be sub- to settlement when peace treat- are finally written with those na- s.

llion from Grant to Credit— postwar settlements to date have lted in transferring over $1 bil- in lend-lease aid from a grant to redit basis. Credits, requiring ment over several years, have unted to $10,080 million in the war period, bringing total grant credit aid to $23,340 million.

uropean Recovery Program par- ants and their overseas depend- ies received grants aggregating 30 million in the 12 months ended 30, 1949, as against $1890 mil- in fiscal 1948. ERP itself pro- vided $3221 million of the fiscal 1949 total; other U. S. grant programs were the source of the additional $858 million reaching the ERP area.

Germany Greatest Beneficiary—In both fiscal years 1949 and 1948—and in the 1945-1949 period as a whole—Germany was the chief beneficiary of U. S. aid in outright grants. It received $2041 million in the postwar period, led all other countries with receipts of $983 million in grants in fiscal 1949 after getting $627 million in 1948.

United Kingdom and France, each of which received over $1 billion in grants over the postwar period, were second and third, respectively. In fiscal 1948 U. K. got $102 million, France, $363 million. Italy, although second among ERP countries for the entire four-year period (it got $1336 million), was given $394 million in fiscal 1949 and $288 million in 1948. China, one of the largest beneficiaries of U. S. grants since end of the war, with a $1533 million total, was furnished $282 million in fiscal 1949.

Bonneville Rate Rise Studied

INCREASED rates are being considered by Bonneville Power Administration officials in the Pacific Northwest because of high postwar construction costs. Federal law requires Bonneville rates to be reviewed every five years. The decision whether to make any change before 1954 must be made by December.

Big Building Month

Construction contract awards in October make third highest volume on record

METALWORKING companies supplying the construction industry have good reason to expect strong demand for their products.

The building upswing which started in August gained striking momentum in October, F. W. Dodge Corp. reports. On top of this the voters in the November elections (see STEEL, Nov. 14, p. 53) authorized more than $1.5 billion of additional state and local government spending, most of which will go into construction projects.

Urge Speed—In view of this snowballing of construction, architects are urging their clients to award contracts as soon as possible during the winter months to beat a possible construction cost rise. Construction costs have been trending downward but expansion of the volume of work to be done, along with the normal soaring of construction activity in the spring, may be sufficient to reverse the trend early in 1950.

This pressure to get construction jobs moving suggests that the demand it will create for products of the metalworking industry will be expressed soon in the form of orders.

Third Highest Volume—The building upswing carried October contract awards in the 37 states east of the Rocky mountains to $1,061,751,000, third highest monthly volume in the Dodge statistical series dating back to the '20s. Only other months showing a higher volume were June, 1942, when construction for war purposes was at a peak, the total then being $1,190,264,000, and September, 1949, when the total was $1,093,724,000.

October's investment commitments brought the cumulative total for this year in the 37 states to $8,472,459,000, or 4 per cent more than in the corresponding ten months of last year.

More Schools, Hospitals—The October upswing was reflected in all major classifications of building and engineering works and in public and private account contracts. Public account projects contributed slightly more than private work to the overall trend. Striking gains were reported for educational and science building, hospital and institutional construction and public nonresidential buildings.

Heavy engineering awards in October were $203,964,000, leaving the total for first ten months of the year 7 per cent over that period last year.

Answers to Labor-Management Harmony Sought

HOW can harmony in labor-management relations be achieved? Seeking the answers, several participants in a panel discussion at the American Management Association's Production Conference in Chicago, Nov. 10-11, gave their views.

Areas in which union-management jurisdiction clashes were outlined by Neil W. Chamberlain, director of research, Labor & Management Center, Yale University; William Gomberg, director, management engineering department, International Ladies' Garment Workers' Union; William W. Aulepp, manager, industrial engineering department, Ford Motor Co.; and C. F. Mugridge, labor co-ordinator, Pittsburgh Plate Glass Co. and Libbey-Owens-Ford Glass Co.

Both Sides Need Each Other — Why is it, Mr. Chamberlain asks, that most managements accept as a proper function of unions the demanding of higher wages but denounce as an overstepping of bounds if the unions offer a program to improve production efficiency to help meet the cost of the boost? Both parties on the labor-management team are dependent on the other, can achieve their objectives more effectively with the other's support. While a collective agreement may specify that authority in production matters rests with management, the co-operative attitude could encourage labor to offer its competence more willingly.

Mr. Gomberg goes further. He says, "The union and a corporation must be viewed as an integrated entity without any hard and fast categories separating them and their operation."

Conflict Shifts—Areas where contests occur over union and management spheres of authority shift from time to time. Establishment of production standards is receiving pointed attention now, Mr. Aulepp states. Unions want to participate in deciding what constitutes a "fair day's work" for a "fair day's pay." A sounder basis for setting production standards is provided from available data "analyzed and evaluated with care and integrity" than would result from bargaining.

Mr. Mugridge says, "Except under precisely defined conditions there is little excuse for management to enter an agreement granting a union joint control of standards. We should not allow ourselves to be coerced into such a course. Negotiating standards is quite a different thing from ceding the right to set them or to determine the norm."

Quality Control Savings

Quality control can mean cost savings to you. That's the opinion of Hugo A. Weissbrodt, works manager, International Harvester Co., Ft. Wayne, Ind., who spoke before the AMA conference on production.

He says that last year his forge department produced 5 million pounds of finished forgings a month. In 1 a quality control system was est lished in that division which enab the department to produce 6 per c more finished forgings per hundr weight of steel received than in 1

Quality control often consists o tabulation of common difficulties chart form. Bringing this to the tention of the employees usually all that is needed to correct sh comings. A graphic presentation monthly improvements helps. Qua control can accomplish savings reducing inventories, scrap, rew materials handling costs, by incre ing equipment capacities and tool and by detecting inefficiencies their source.

Republic Lights New Coke Ov

FIRST coke has been produced a new battery of 38 coke ovens at public Steel Corp.'s Youngstown trict steel plant.

The new battery replaces one four older batteries. Construction a second bank of 65 ovens is progress. It will replace two of remaining three old batteries.

Republic has already compl construction of a new battery of coke ovens at its Warren, O., dist plant, and a second bank of 40 ov is under construction. These new batteries replaced 64 old ov In addition, Republic recently chased the RFC battery of 61 ov at Warren and is continuing to o ate these.

OBITUARIES...

James Hobbins, president, **Anaconda Copper Mining Co.,** New York, died of a heart attack Nov. 14 while on an inspection tour in Butte, Mont., with other officials of the company. He joined Anaconda in 1922 and became vice president and director the following year. He was named president in 1940.

—o—

Ernest Richardson, retired president and co-founder of **Ingram-Richardson Mfg. Co.,** Beaver Falls, Pa., died Nov. 11 of a cerebral hemorrhage. He also was vice president of Ingram-Richardson Mfg. Co. of Indiana Inc. at Frankfort, Ind.

—o—

Karl B. Britton, 66, for a number of years associated with **Thompson Products Inc.,** Cleveland, and recently vice president, **Britton Controls Inc.,** a group engaged in development of automotive appliances, died Nov. 15. In the early years of the automobile industry he was associated with a number of organizations, including Winton and Duesenberg. He was an expert in automotive design and mechanics.

—o—

Philip S. Cottier, 59, purchasing agent, **Pittsburgh Steamship Co.,** subsidiary, U. S. Steel Corp., Cleveland, died Nov. 11.

—o—

Walter S. Rearick, 52, vice president and works manager, **Aluminum Cooking Utensil Co.,** New Kensington, Pa., died Nov. 12 at his home in Pittsburgh. He joined this subsidiary of Aluminum Co. of America in 1924.

—o—

Jules Z. Renaud, sales engineer with **Dominion Bridge Co. Ltd.,** died recently at his home at Laval des Rapides, Que.

—o—

William H. Shafer, 53, a founder and partner in **Watkins Engineering Co.,** screw machine products concern, Cincinnati, died Oct. 26. He helped establish the firm in 1941 and previ ly had been associated with N Screw Machine Products Co.

—o—

Harry W. Miller, 59, production m ager, **Buffalo Wire Works Co.** Buffalo, died Nov. 7. He was with firm 39 years.

—o—

Charles E. Brown Jr., 55, vice pr dent and general sales mana **Okonite Co.,** New York, died rec ly.

—o—

Cornelius J. Barry Jr., president **Superior Plating Works,** Chic died Oct. 17.

—o—

Herman P. Grube, 75, for 27 y treasurer, **Douglas Aircraft Co.** died Oct. 28 in Los Angeles.

—o—

Oron Otto Stichler, 69, retired countant for **American Steel & Co.,** Cleveland, died recently heart attack. He was with the pany from 1905 to 1945.

ool Outlook Brightens

Builders stress replacement needs at NMTBA convention. David Ayr is new president

ACHINE tool builders believe 1950 ay be a pretty fair year. This is the nsensus of 200 delegates, represent- 172 manufacturers of machine ols and metalforming equipment o attended the 48th annual meet- of the National Machine Tool ilders Association at the Green- er, White Sulphur Springs, W. Va., v. 16-18.

Despite a dearth of new orders ring the summer and early fall, a te of renewed confidence was ap- rent at the convention. Many mem- rs report the end of the steel ike brought out a considerable ve of inquiries as well as an en- raging number of actual new or- rs. Other orders, held in abeyance strike conditions, are being re- tivated. While the revival is by no ans sensational, it is encouraging ilders to hope for better business xt year.

Ripe for Replacements—This con- ence was sustained throughout the vention by a number of papers owing that American industry is e for a big replacement of worn t and outmoded metalworking ma- nery.

Lloyd D. McDonald, 1948-49 presi- nt of the association and vice sident of Warner & Swasey Co., veland, sounded the keynote. While industry knows the basic require- nt for social and economic prog- s is greater productivity, metal- rking plants now are equipped h an undue number of machine ls of design and vintage of 1940 d earlier.

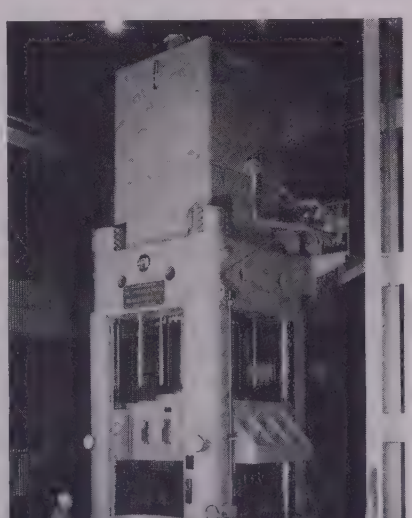
Labor Sets Productivity Ceiling— McDonald also is worried about v worker productivity: "We see e amazing spectacle of machine l operators, under the leadership union stewards, actually holding n the output of new machines to fraction of the great productivity t has been built into them. The ult of such limitations is that the blic is not getting the benefit of vances in machine tool design. Peo- today are paying more for a at many things than they should paying in view of the ability of hindered machines to produce ngs faster, better and cheaper."

Machines Are Old—A survey of the e of machine tools in American nts shows that 95 per cent of ls now in use are more than 10 ars old as far as design is con- ned, says Burnham Finney, editor,

DAVID AYR

American Machinist. A substantial portion actually was built before 1940.

Warning against paying too much attention to recovery in Europe and too little to what is happening at home was sounded by A. G. Bryant. Past president of the NMTBA and vice president of Cleereman Machine Tool Co., Green Bay, Wis., Mr. Bryant said: "We have unfolded plan after plan for support and rehabilitation of other countries of the world—all these plans being initiated by Americans and supported by American taxpayers. Unfortunately, we have not shown a corresponding sense of responsibility in discussing aid toward preservation of our own industrial vitality. It is paradoxical that our government devotes so much initiative to plans for building industrial and financial strength abroad, but neglects the crying need for maintaining industrial might in America."



FOR TV SETS: Working with its twin, another huge press, this hydraulic giant makes four TV cabinets in ten minutes. Built by Hydraulic Press Mfg. Co., Mt. Gilead, O., it follows standard compression molding procedure

Ayr New President—David Ayr, president and general manager, Hendey Machine Co., Torrington, Conn., was elected 1949-50 president of the association. A native of Scotland, Mr. Ayr laid the foundation for his machine tool career at Brown & Sharpe Mfg. Co., Providence, R. I. Subsequently, he was with Pierce-Arrow Motor Car Co., Buffalo; Russell Motor Car Co., Buffalo; and vice president and general manager, Russell Gear & Machine Co., Toronto. From 1924 until 1934 he was works manager, Pratt and Whitney Division, Niles-Bement-Pond Co., Hartford, Conn.

Richard E. LeBlond, who is president, R. K. LeBlond Machine Tool Co., Cincinnati, was elected first vice president of the association.

Frederick S. Blackall Jr., president and treasurer, Taft-Peirce Mfg. Co., Woonsocket, R. I., is second vice president. Jerome A. Raterman, president, Monarch Machine Tool Co., Sidney, O., is treasurer. Tell Berna continues as general manager and Mrs. Frida Selbert as secretary.

New directors include Messrs. Blackall and Raterman and R. W. Glasner, president, Clearing Machine Corp., Chicago.

More About Hot Machining

Here are a few details on the hot machining techniques developed by Sam Tour & Co. Inc., New York, and Kearney & Trecker Corp., Milwaukee (STEEL, Nov. 7, p. 82). The former company used induction heating on a lathe and the latter firm heated the work piece with a gas flame on a milling machine.

Low and medium steels, chromium and nickel steels are machined three to four times faster than with conventional room temperature procedures. High temperature cobalt-chromium jet and turbine alloy—S 816—can be turned in a 5 horsepower lathe with a 0.187-inch depth of cut and a 0.015-inch feed at 134 surface feet per minute, a removal rate 100 times that obtainable at room temperature. Stainless steel and as-rolled K Monel metal also are readily machined.

Success of the process stems from the fact that shear strength and resistance to deformation of metals decrease with heat. Other cutting forces such as pressure at the tool point and tool friction also are decreased. Cemented tungsten carbide tools are not affected by heat generated in heating the work, heat evolved by cutting or heat in the chip being formed.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, ST*

Business lags behind labor and the farm bloc which remember: "The squeaking axle gets the most grease." There just isn't much effective friendship in government for business

AS ANY BUSINESSMAN, you may wonder why the Commerce Department does not fight for business the same way the Agriculture and Labor departments fight for the farmer and the workingman.

Lots of people are wondering the same thing of late. One reason is the biased utterances from several cabinet members. Here's an example: Labor Secretary Maurice Tobin in a radio broadcast during the steel strike dumped the whole cause of the strike in the lap of steel management. Company officials, he said, should have accepted the pension proposal of the President's fact-finding board.

Commerce Secretary Charles Sawyer—government's chief spokesman for business—left the charge unanswered. More than one businessman regarded the fact as just another indication that business has few friends in the government.

Unfortunately this feeling is warranted because there isn't much effective friendship for business in the government. Everyone talks about helping small business. But the problems of small business continue to multiply. Big business is regularly lambasted by the President who ignores entirely the fact that big business is the breadbasket and stabilizer of tens of thousands of small firms.

In his Kansas City speech he blamed "special interests" for slowing expansion of the national income from $200 to $300 million and preventing $2000 family incomes from rising to $4000. He was true to his usual form.

A Way Out—Administration policy, then, is one reason why Secretary Sawyer does not fight with the same fervor as you find in the Labor and Agriculture departments. Unless he is prepared to follow the example of Dr. Nourse, Mr. Sawyer must follow administration policies.

Another reason why he is hampered in fighting for the interests of business lies in the assignment of administrative responsibilities. Treasury handles tax policy; Justice and Federal Trade Commission look after monopoly and pricing policy; Interstate Commerce Commission fixes freight rates; State Department takes care of tariff matters; Council of Economic Advisers co-ordinates economic policy. An so on.

Little Leeway—Under that setup the secretary of commerce has little leeway; there isn't an awful lot he can say on subjects of vital import to business without trespassing in the provinces of other departments and agencies. It leaves the department in the position of conducting fine and valuable statistical and informational services—but powerless to fight agressively for badly needed reforms to encourage business.

Secretary Sawyer is given credit for speaking for business in cabinet meetings and in interdepartmental conferences. So far, on such fundamental matters as tax policy, increased government spending and wage spirals, his advice has not prevailed.

Still another reason why the secretary is unable to fight effectively for reforms in government's policies toward business is that he represents a segment of national life which is singularly inarticulate in Washington. When something happens which makes labor or the farmer unhappy, a storm of protest and denunciation is heard from one end of Pennsylvania avenue to the other. When something displeases business—that's too bad.

The sad fact is that business does not provide sufficient inspiration to the commerce secretary or anyone else in Washington to act as its fighting leader and advocate. Business has not yet awakened to the realization that in Washington you are likely to get what you want if you make enough noise. Business lags far behind labor and the farm bloc; these groups continually prove the truth of the adage: The squeaking axle gets the most grease.

War Assets Ends Dec. 31

WAR ASSETS Administration, recently made a part of the new General Services Administration, will terminate its existence on Dec. 31.

From a peak employment of 59,000 in November of 1946, its staff has dropped to 625, of whom about half will be retained by GSA to carry out remaining functions. These include administration of industrial plant leases, and disposal of real estate valued at $500 million and aircraft components valued at $350 millio
During its career the WAA liquidat
surplus World War II material whi
cost the government $25.6 billio
Drummond Jones of the WAA st
is preparing a history of the ent
surplus liquidation program to
printed in book form so that t
lessons learned may be readily ava
able in case another big liquidati
job again becomes necessary.

14 Million on Federal "Payroll

THE FEDERAL government is n
making regular, direct payments
14,187,000 of its citizens either
employees or beneficiaries under va
ous acts of Congress, says Sen. Ha
ry F. Byrd (Dem., Va.), chairm
of the Joint Committee on Reducti
of Nonessential Federal Expenditur

Of the total, about 2,011,000 a
on the executive, legislative and ju
cial payrolls as employees. The oth
that are receiving government chec
fall into these groups:

Military payroll 1,600,000; milita
and veterans' pensions and aid ro
3,000,000; civil pension rolls 140,0
aid to dependent children 1,250,0
aid to the blind 86,000; farm pa
ments 3,100,000; old-age assistan
payments outside of the contributo
system 2,500,000; members of Natio
al Guard and military reser
500,000.

To Measure, Classify Noise

PRINCIPAL outcome of the conf
ence aimed at eventual eliminati
of radio noises caused by inciden
electrical equipment and devices w
the appointment of a committ
headed by Dr. J. J. Smith, Gene
Electric Co., Schenectady, N. Y.

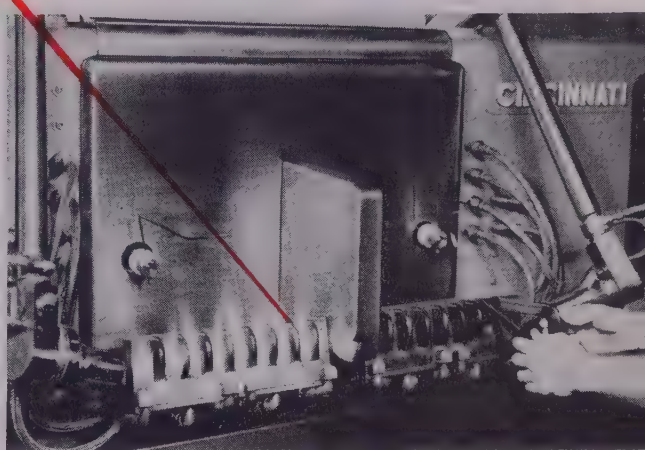
The committee will report to F
on development of methods and
struments for measuring, evaluati
and classifying interference noises.
also will report what is being d
by manufacturers and Committ
C-63 of the American Standards
sociation.

P. J. Kent of Chrysler Corp. w
asked to obtain information from
automotive industry about what
be done to reduce ignition interf
ence from spark plugs in automo
engines.

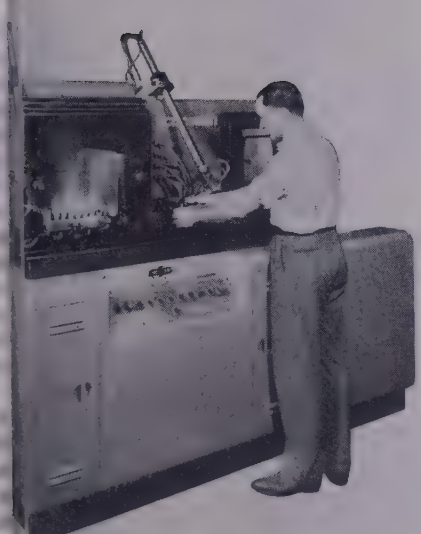
Harold H. Beizer, Army Sig
Corps, says the Signal Corps
the Navy have been conducting
intensive investigation for deal
with nuisance-type interferen
noises. They have made some pr

fh FLAMATIC *specified* Ridge Tool pipe wrench jaw (AISI 8750) to be hardened to Rc 56 to 58 in area shown; rest of part not to be affected.

dge Tool Co. puts more bite in wrench jaws



h flamatic selective surface hardening



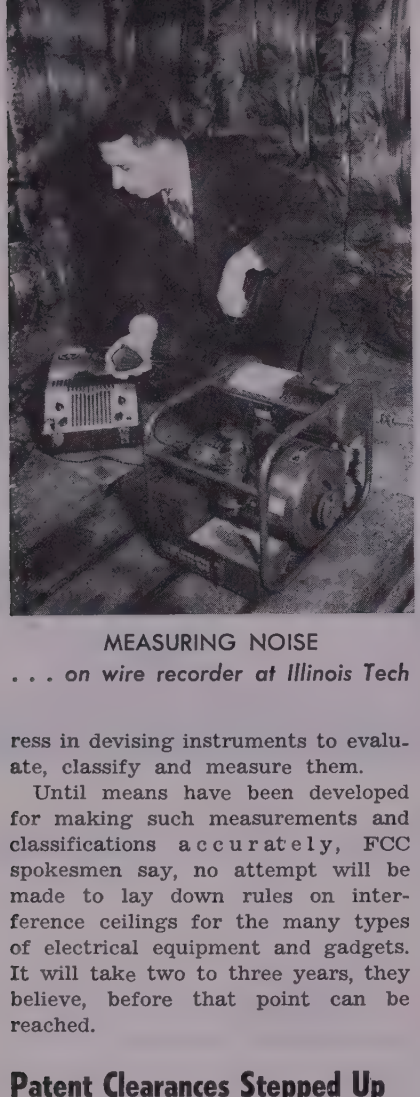
achieved fh FLAMATIC **makes substantial cost cuts over conventional hardened jaw inserts. Production rates: approximately 1200 parts per hour. Surface hardnes pattern, and gradient held to specs uniformly . . .** To date, Flamatic has been applied largely to rotating parts such as gears, cams, drive shafts, clutch adjusting nuts—or which Flamatic's rapid heating and electronic temperature control hold parts to closer specs—at lower cost—than practical with other methods. Now—again—Flamatic mak important news: selectivity hardening non-symmetrical parts such as wrench jaws, plier jaws, snip blades, etc., where high production rates and low unit hardening costs are key factors.

This unique dual burner Flamatic setup for hardening Ridge Tool pipe wrench jaws is an example. Operator loa eight parts on burner assembly and presses button. During heating cycle on one burner, operator loads the other. Determine now if Flamatic surface hardening can help make your product **better, for less money.** Send a part print for analysis and write for **"fh,"** the new booklet of Flamatic case histories.

lamatic

THE CINCINNATI MILLING MACHINE CO.

Cincinnati 9, Ohio, U.S.A. • CINCINNATI



MEASURING NOISE
. . . on wire recorder at Illinois Tech

ress in devising instruments to evaluate, classify and measure them.

Until means have been developed for making such measurements and classifications accurately, FCC spokesmen say, no attempt will be made to lay down rules on interference ceilings for the many types of electrical equipment and gadgets. It will take two to three years, they believe, before that point can be reached.

Patent Clearances Stepped Up

FOR the first time since 1943 the Patent Office is clearing patent applications faster than it is receiving them.

Due to the increase—from 800 to 1000—in the war-depleted force of examiners, the backlog of applications has been reduced from 146,972 in October of 1948 to 137,540 in October of this year, says Lawrence C. Kingsland, retiring commissioner of patents.

The objective toward which the office is working, Mr. Kingsland told STEEL, is the final issuance of patents within 18 to 24 months after the applications have been received. At the present rate for applications, it will take four to five years with the present staff to reach that stage. Applications received in the third quarter of this year were 15,567—an annual rate of 62,000 to 63,000. This compares with 66,292 applications received in fiscal 1949 and 73,385 in fiscal 1948 when war-delayed applications still were coming in in volume.

About 57 per cent of applications result in patent issues, said Mr. Kingsland. About 5 per cent of patents granted are forfeited due to nonpayment of fees.

Mr. Kingsland will rejoin the patent law firm of Kingsland, Rogers and Ezell, St. Louis, Dec. 1. Succeeding him as patent commissioner with an interim appointment, will be J. A. Marzall, of Spencer, Marzall, Johnston and Cook, Chicago.

New OIT Information Plan

IF YOU have been confused by the erstwhile informal government policy about supplying unclassified technical information to foreign countries or foreign agents, you should be helped by a new plan just adopted by the Office of International Trade.

The new plan leaves you free to export any unclassified information but asks your help in preventing export of anything that might be harmful to United States security. When in your opinion the export of certain data might hurt the national security, you are asked to delay action until you have written to OIT and obtained an official opinion. In the absence of statutory authority, the OIT is relying upon voluntary compliance.

When in Doubt, Get Opinions — What kind of unclassified information might be harmful to national security if exported? OIT has been unable to phrase an exact definition but says it includes "uniquely held" data about "advanced" technological and scientific developments, prototypes and special installations. Included also are the unclassified implements of war which, by Executive Proclamation 2776, are under export control by the State Department. The general rule is: When in doubt about certain data having security significance, get an opinion from the OIT.

Do not write when you wish to export catalogs or pamphlets, assembly and operating directions, business or technical periodicals or other material that has been published or is generally available.

As before, no classified data—designated "restricted," "confidential," or "secret" may be exported or supplied to foreign agents unless the exporter has received permission in writing from the classifying officer or agency.

New General License—Any person exporting technical data hereafter will use a new general license designated as GTD. Envelopes or wrappers containing technical data for export are to be marked plainly "General license GTD."

Requests for an official opi should go in duplicate to the O of International Trade, Commerce partment, Washington. They sh contain complete information. T is a special setup for patent attor and others who contemplate ex ing technical data pertaining to ent applications or applications the registration of a utility mode dustrial design, or model of an vention made in the United State those and similar cases, inqu should be directed to the Com sioner of Patents, Commerce De ment, Washington.

Complete description of the voluntary plan is contained in Current Export Bulletin No. mailed to subscribers to Compr sive Export Schedule No. 27. You get it for 10 cents at any Comm field office.

Renegotiation Rules Availab

PRINTED COPIES of the "Re tiation Regulations" are avai from the Superintendent of D ments, Government Printing O Washington.

The subscription price is $2.5 includes copies of all amendm supplements and periodic lists c negotiable contractors and cont to be issued over the next 12 mo Subscribers also will receive complete lists of all renegotiable tractors and contracts as of Jun 1949.

Renegotiation now applies to tain types of contracts specifi Public Laws 547, 753 and 766, Congress. Under Public Law 434 Congress, it applies to all negot contracts entered into during 1950 when those separate cont are for amounts in excess of and when the contractor has under such contracts in any year in excess of $100,000. A sc ing feature of Public Law 434, Congress, provides that the limitations of the Vinson-Tra Act shall not apply to any cor or subcontract that is subject t negotiation.

Munitions Board Staff Dire

STAFF DIRECTOR of the Mun Board is now Major General Pa W. Timberlake, Air Force. He ceeded Lieutenant General I Lutes, United States Army, appo as commanding general of the F Army with headquarters at San tonio, Tex. General Timberlak been with the Munitions Boar the predecessor Army-Navy tions Board since late 1946.

utos Set the Pace in Western Europe

Auto industries bolster economies of ERP nations. British domestic market not yet scratched. French output mounts. Germans design a $600 vehicle

E AUTOMOTIVE industry is help- Western Europe to keep its eco- ic wheels from getting completely of line.

ndustrial production in the Mar- l Plan countries during the sec- quarter reached a peak of 18 cent above prewar. Output was ed by the motor vehicle and steel stries then. Now in the fourth rter automakers have a clearcut l because steel production has ped in France, Western Germany Belgium.

reat Britain has barely scratch- the domestic market for its cars. orts are holding up so well that average Briton has as much uble buying an auto today as he in 1946.

s automobile producers the nch are now surpassed only by British and Americans. French ut has been steadily increasing e the first of this year. More n 18,000 cars were assembled in tember for an alltime postwar h.

he Germans have already pre- ed blueprints for a low-priced icle which will be cheaper than the Volkswagen, now one of the best selling autos in Europe. Volkswagen export sales are beginning to be hit by Britain's pound devaluation.

The Belgians, who have no large domestic automobile industry, are the largest importers of cars in Europe. The nation's gasoline consumption is twice what it was before the war. Its $25 million highway improvement program for the current fiscal year will relieve growing traffic problems.

French Auto Output Gains

The French boosted their automobile production from 11,000 in January to 17,000 in June to 18,112 in September. Only 15,200 cars were assembled in September, 1938. Commercial vehicle output totaled 8582 in September, against 3750 in September, 1938.

Automobile exports have increased more than four-fold since the war, from 24,000 in 1938 to an expected total of 110,000 in 1949. Last year auto exports brought a net profit of $90 million into the country.

"A whole network of highways must be built in France as soon as possible, or our traffic problem will get acute," says Christian Pineau, minister of transportation and public works who just returned from the U. S. "We should model our highways on those in America. In city road construction, our model could be the Los Angeles network."

A plan for co-ordination of French railroads with bus and truck lines has been adopted. Within each department, the French National Railroads will stop competing with busses. Whichever is the most economical in each area—railroads or busses and trucks—will be continued.

The French industrial index is rising only because of the good automotive showing. Coal production is stable, although labor productivity is increasing a little. Steel output has dropped.

Work is progressing on the Denain mill, the first modern continuous strip mill on the European continent. The new mill, begun in October, 1947, is being built for Union Siderurgique du Nord de la France, known as Usinor. Usinor was formed by the merger of Hauts Fourneaux, Forges et Acieries de Denain-Anzin and Forges et Acieries du Nord et de l'Est. Besides the hot strip mill at Denain, a cold rolling mill will be built at Montataire, about 100 miles to the south and near Paris.

The dollar cost of the project at Denain which is 120 miles north of Paris amounts to $29.1 million and is being financed by the ECA, the Export-Import Bank and the International Bank of Reconstruction.

French steel experts estimate that the Usinor and the new Sollac mills to be built in Lorraine, also with ECA aid, together will produce enough steel to meet the needs of France and its territories and an ad-

NEW DENAIN STRIP MILL
. . . will provide steel for French autos

RSELESS BUGGY: Parisians, once proud owners of the brand new automobiles of years gone by, had their hour in the French capital. Three dozen coughed and choked their way in a race to the top of a Paris hill. Here, in a 1901 Clement-Panhard-Levassor patched together for the race by driver Andre de Neve, is French comedienne "La Houppa"

ditional 250,000 tons annually to export.

Germans Need Cheaper Car

A new car which may replace the Volkswagen is on the drawing boards in Western Germany. The new vehicle has two cylinders, 15 hp, accommodates three persons, has a maximum speed of 50 miles per hour and weighs 770 pounds. It is engineered to sell for $600, in contrast to the $1050 to $1300 domestic price tag on Volkswagen models.

The Volkswagen has four cylinders, 25 hp and a maximum speed of 65 miles per hour. Its success has been sustained by good export sales, but the British devaluation is threatening its position. Volkswagen exports reached only 102 in October, against 372 in September and a monthly average of 613 during the first half of 1949. Production still climbs; 4681 were assembled in September, 4878 in October.

The car was offered freely for the first time in October to prospective domestic purchasers, but the results were disappointing. The $1050 price (4800 marks) is too steep for the average German.

Steel ingot production declined to 762,779 net tons in October from 836,085 tons in September. This is the result of general credit and capital stringency. Production of about 770,000 tons is expected this month.

German export steel prices are still below those of the British, Belgians and French, but the Allies limit foreign sales to 900,000 tons yearly.

Belgian Roads Overhauled

Belgium, with a national economy dependent upon commercial traffic, is using a large slice of its $50.9 million Marshall Plan loan to improve its transportation and port facilities.

About $22,950,000 in loan funds have been earmarked thus far for construction of better highways, the elimination of shipping bottlenecks, installation of new petroleum docks in Antwerp and completion of an underground railway link.

Belgium's highways, which are carrying more traffic now than before the war, are being improved with the help of $12,350,000 in loan funds. The sum represents about half the money Belgium has budgeted for highway improvement during the current fiscal year. The program calls for elimination of railroad grade crossings by means of under and overpasses, the enlarging of ten major roads into four lanes and the rechanneling of highway traffic in congested areas.

Marshall Plan loans of $5.7 million will help link Belgium's north and south railway networks in the heart of Brussels. Interrupted by two World Wars, construction of this underground link will be completed by 1952. The link will permit freight cars to roll more rapidly through city from the industrial south northern ports like Antwerp.

In Antwerp, construction of a petroleum port will be partly nanced by $3.4 million in ECA lo

Gas and Oil Gain on Coal in Domestic Heating

PEOPLE are becoming increasingly unwilling to go into their basements to shovel coal.

The reluctance of John L. Lewis' miners to go into the lower regions of the earth for the fuel is spurring a trend to convert to gas or oil in home heating. As indicated in the accompanying chart, the number of homes which are centrally heated by coal has increased 24 per cent in the past decade. The use of oil furnaces has jumped 135 per cent; a 136 per cent gain in the use of gas units has occurred.

Coal Far Ahead—But coal still is far ahead as a fuel for heating. Of the three major heating fuels, coal today has 67.1 per cent of the market, compared with 79.5 per cent in 1939. Oil now has 19.9 per cent of the market, but it had only 12.4 per cent ten years ago. Gas serves 13 per cent of the market now, compared with 8.1 per cent a decade ago.

The magazine *Fueloil and Oil Heat* estimates that 13.5 million dwelling units are centrally heated by coal now, compared with 10.9 million in 1939. Today about 4 million use oil; only 1.7 million used it ten years ago. Nearly 2.6 million heat with gas n compared with 1.1 million a dec ago.

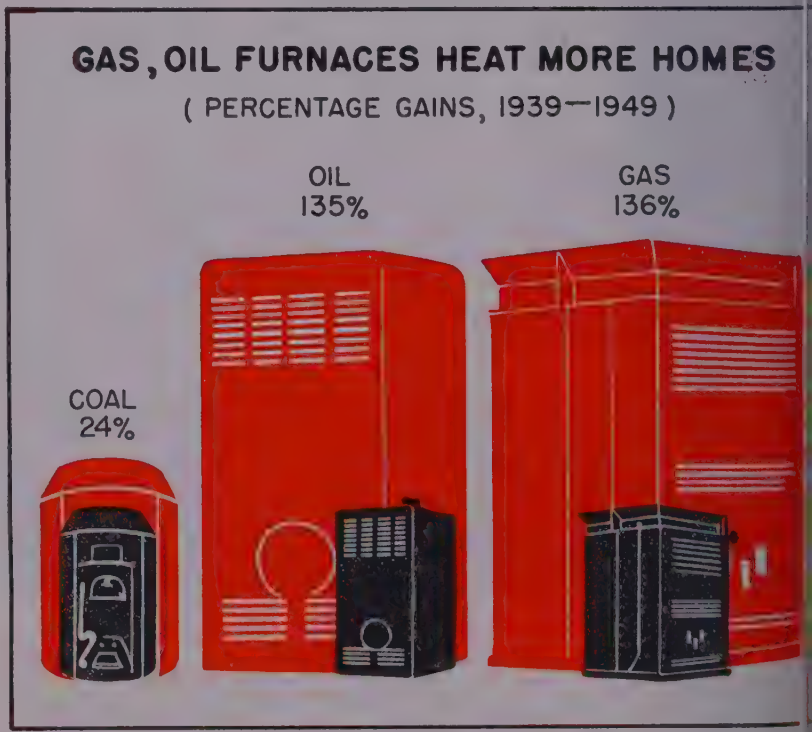
Conversion Hampered—Of the million coal consumers, oil and furnace manufacturers claim at 9.9 million would like to conv They cannot because of the expe of a new furnace or restrictions the use of oil or gas still existing some areas. Natural gas restricti will be lifted for an additional million potential customers by end of this year.

The lifting of such restrictions better supplies of oil and gas spurring more conversions, Comm Department figures reveal. This t shows shipments in units.

	First 7 mos. 1949	First 7 mos. 1948	T
Gas fired warm air furnaces..	103,094	88,341	18
Oil-fired warm air furnaces..	83,228	78,100	19
Solid-fuel warm air furnaces..	100,938	178,877	39

Oil, Gas Supplies Good

If you're worried about fuel plies this winter, your problems over—provided you can use oil natural gas. Supply outlook for solid fuels for industrial purpose



best since the war. Sales prospects are also excellent, largely because of John L. Lewis' coal tactics. Consumption of industrial grades of fuel oil will likely be up 5 to 6 per cent this year over 1948, but industry can easily handle the increase. Comparable or even better gains are anticipated by natural gas suppliers who expect to meet the increased demand by 7045 miles of line authorized for construction by the Federal Power Commission in the 12 months ended June 30, 1949. Much of this will be ready for service this winter. At the end of 1948 there were 251,330 miles of natural gas transmission lines in the United States. That's 26,000 miles more than there are point-to-point railroad lines; and it exceeds the total oil pipelines by more than 100,000 miles.

Even if this nation has unusually cold weather for the rest of the winter, oil and gas men think supplies should be adequate. They are being flooded with inquiries about converting from coal, but this is a poor time of the year for a switch. Look for considerable conversion activity in industry next spring. The trend to oil and gas is indicated by this table which shows the percentage distribution of the energy supply in the U. S.

	1939 (Per Cent)	1948 (Per Cent)
Anthracite coal	6.1	4.2
Bituminous coal	44.9	42.4
Petroleum	33.8	35.1
Natural gas	11.6	14.3
Water power	3.6	4.0
	100.0	100.0

Industry Talks to Itself

Foundry speakers plead for better public relations. Mason urges government contacts

INDUSTRY must stop talking to itself.

That plea for better relations with employees, the public and government was made by speakers at the 53rd annual meeting of the National Foundry Association, Nov. 10-11 in New York.

Lowell B. Mason, member of the Federal Trade Commission, said most business men "know how to meet a payroll, but not a senator." He urged them to keep in touch with legislative activities.

He also cautioned them that the broad federal agencies as the FTC bear watching because "despotism is never so much to be dreaded as when it pretends to do good."

FTC Has Broad Goals—"The FTC," he said, "is created by a statute which commands this group of men to prevent unfair acts and practices in business.

"It is more important that the eye of freedom be turned oftener to scrutinize those agencies like the FTC operating without legislative criteria than agencies created by government to accomplish specific ends such as delivery of the mail or the management of an army.

"An antitrust agency that reaches effectual maturity stands not for an antitrust policy but for an antitrust policy plus the agency's own instinct to perpetuate itself in the terms and special interests of those who are in that agency and wish to stay there."

School for Bosses

THEY'RE hanging a school bell beside the factory whistle and giving the boss a slate at Westinghouse Electric Corp. plants.

Company officials say a unique management school is enrolling supervisors from foremen to managers to study the latest principles of successful management at various Westinghouse plants.

Instead of readin', writin', and 'rithmetic, the school emphasizes human relations and the application of the social sciences to specific management problems. The management school is divided into three stages: 1. Human relations in management and how they affect a man and his work; included are effective speech, leadership principles, elements of instructing, applied phychology. 2. Technical factors of management includes job methods, quality control, plant safety, cost control and wage incentives. 3. Discussion meetings are used to talk over changes in company policies and legislation affecting the conduct of business.

Labor Contract "Patterns" Hit—The association passed a resolution urging members not to slavishly follow labor pension "patterns" which unions may say are developing. Pensions and every other phase of employee relations must be considered in the light of individual conditions.

Harry E. Ladwig, Allis-Chalmers Mfg. Co., was elected president, and A. V. Martens, Pekin Foundry & Mfg. Co., Pekin, Ill., vice president. L. E. Roark was re-elected executive vice president, and J. P. Ahern and E. E. Friess were named executive director and secretary. E. B. Sherwin, Chicago Hardware Foundry Co., North Chicago, Ill., was elected treasurer.

CALENDAR
OF MEETINGS

Nov. 25-26, American Foundrymen's Society: New York regional conference, Syracuse University, Syracuse, N. Y. Society headquarters are at 222 W. Adams St., Chicago.

Nov. 26, American Iron & Steel Institute: Regional technical meeting, Thomas Jefferson Hotel, Birmingham.

Nov. 28-Dec. 2, American Society of Mechanical Engineers: 70th annual meeting, Statler Hotel, New York. Society headquarters are at 29 W. 39th St., New York.

Nov. 28-Dec. 3, 22nd Exposition of Chemical Industries: Grand Central Palace, New York.

Nov. 30-Dec. 2, Society for Experimental Stress Analysis: Annual meeting, Hotel New Yorker, New York. Society postal address is Box 168, Cambridge 39, Mass.

Dec. 1-2, Council of Profit Sharing Industries: Second annual conference, Hotel Roosevelt, New York. Council headquarters are in the First National Tower, Akron.

Dec. 1-2, American Management Association: Conference on corporation finance problems, Waldorf-Astoria Hotel, New York. Association headquarters are at 330 W. 42nd St., New York.

Dec. 2, American Council of Commercial Laboratories: Meeting, Hotel Statler, Washington. Council headquarters are at 318 Evans Bldg., Washington.

Dec. 6, Material Handling Institute: Annual meeting, Hotel Commodore, New York. Institute headquarters are in the Clark Bldg., Pittsburgh.

Dec. 7-9, National Association of Manufacturers: Congress of American industry, Waldorf-Astoria Hotel, New York. Association headquarters are at 14 W. 49th St., New York.

Dec. 8-10, American Institute of Mining & Metallurgical Engineers: Seventh annual conference of Electric Furnace Steel Committee. Institute headquarters are at 29 W. 39th St., New York.

Dec. 9, Malleable Founders' Society: Western sectional meeting, Drake Hotel, Chicago. Society headquarters are at 1800 Union Commerce Bldg., Cleveland.

Dec. 12-15, National Warm Air Heating & Air Conditioning Association: Meeting, Hotel Cleveland, Cleveland. Association headquarters are in the Society for Savings Bldg., Cleveland.

Dec. 26-31, American Association for the Advancement of Science: Meeting, New York. Association headquarters are at 1515 Massachusetts Ave., Washington.

Jan. 10-11, American Home Laundry Manufacturers' Association: Fourth national home laundry conference, in Chicago.

Jan. 10-12, Conference on Industrial and Safety Problems of Nuclear Technology: Sponsored by New York University and Atomic Energy Commission, at New York University, Washington Sq., New York.

Jan. 10-13, Society of the Plastics Industry, Reinforced Plastics Division: Meeting, Hotel Cleveland, Cleveland. Society headquarters are at 295 Madison Ave., New York.

Jan. 16-19, Plant Maintenance Show: Sponsored by American Society of Mechanical Engineers and Society for the Advancement of Management, at the Public Auditorium, Cleveland. Mechanical Engineers' headquarters are at 29 W. 39th St., New York.

Jan. 18-20, American Society of Civil Engineers: Annual meeting, Hotel Commodore, New York. Society headquarters are at 33 W. 39th St., New York.

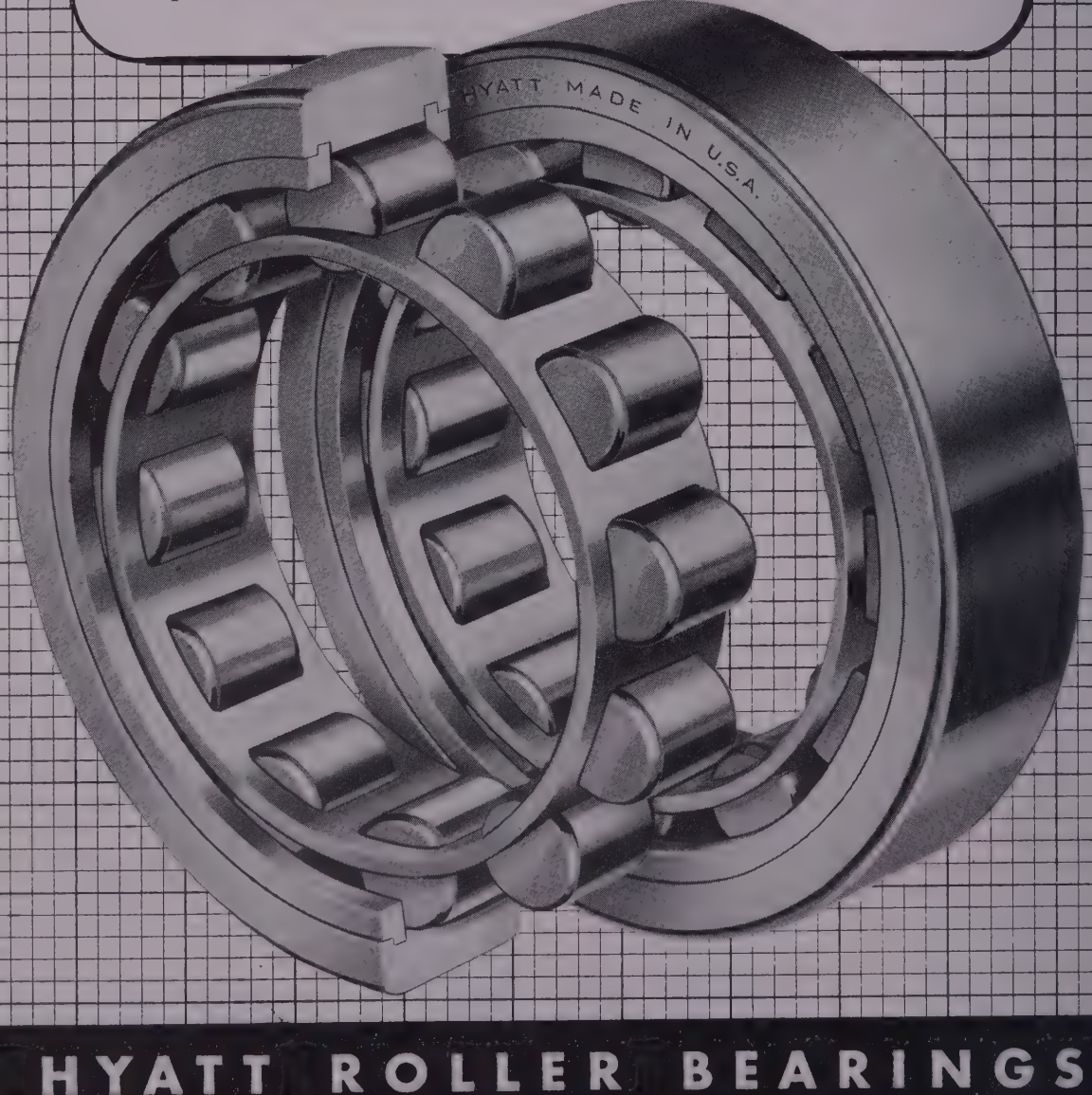
Jan. 22-24, Institute of Scrap Iron & Steel Inc.: Annual convention, Hotel Statler, Washington. Institute headquarters are in the Dupont Circle Bldg., Washington.

Designed in . . . for life

The straight cylindrical construction of Hyatt Roller Bearings permits radial loads carried by the bearing to be evenly distributed over the entire length of the rollers. The larger area of contact between the load carrying elements in straight cylindrical bearings results in greater bearing capacity and longer life with less maintenance.

Size for size, Hyatt Hy-Load Roller Bearings offer maximum radial load carrying capacity. They are "designed in" for the life of your equipment.

To get the most out of the equipment you build, sell or buy, be sure that it is equipped with Hyatt Roller Bearings. Let us tell you more about what we can do for you. Write to Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.



HYATT ROLLER BEARINGS

A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

New Ford models hit dealers' showrooms. Exterior changes are slight. Body and frame strengthened and other mechanical improvements made

DETROIT

U have to look sharply to catch t· differences between the 1949 and 50 Fords which hit the showrooms t Friday, but they are there, both the outside and on the inside. all wonder that the changeover s accomplished with only two days' erruption to production, the new ies starting down the assembly es Nov. 2.

Exterior body styling alterations lude redesigned and relocated rking lights, a new hood ornament, vorked deck lid handle and a Ford st appearing on the front for the st time in history. The latter is ived from an authentic coat of ns dating back to when William rd, father of the late Henry Ford, migrated to the U. S. from County rk in Ireland. The Ford ances- s journeyed to Ireland from the inity of Somersetshire and Devon- re, England.

Doubtless, few buyers are going wax overly ecstatic about this bit historic lore, but at any rate the st is there for all to see—three lds of red, white and blue, separat- by a black chevron marked with e gold spheres and three golden ns regardant—measuring 3 inches de and 3¼ inches high. One can most hear the late Mr. Ford snort- over this touch; that stuff was ver for him.

Engines Improved—More on the hnical side, a number of improve- nts are announced for both the ylinder and V-8 Ford engines, ich will also be incorporated in rcury engines. The camshaft tim- gear has reverted to laminated th impregnated with bakelite sins molded under pressure, re- cing a permanent mold aluminum sting. The latter was adopted rtly after the war when it was ficult to obtain the molded ma- ial in sufficient quantity, and while aluminum operated satisfactorily, gear was inclined to be noisy.

Pistons have been changed to the tothermic type, in which a steel ut is cast into the aluminum skirt ter to control expansion and con- ction. The new pistons are being fit- as close as 0.0005-inch clearance d have pins offset 1/16 inch toward the thrust side as an aid to elimination of piston noise.

FIRST CREST IN FORD HISTORY
. . . never for the late Henry

Camshaft Redesigned — Camshaft has been redesigned with longer opening and closing ramps to minimize tappet noise, while three steps have been taken to bolster oil economy, an oil squirt hole has been added in connecting rods to provide instant lubrication of cylinder walls after a cold start, cylinder wall finish has been changed to give better oil control, and rubber seal rings have been placed on intake valve stem guides to prevent leakage of oil past the guides.

A three-bladed fan on the V-8 replaces the former four-bladed unit, while fan speed has been reduced to 0.9 engine speed. Fan belts are of narrower section and the drive is rearranged so each of the two belts drives only three pulleys. Cooling is not reduced, but a lot of fan "roar" has disappeared. Other engine features include hardened valve seat inserts on exhaust side, duplex water pump and series flow cooling, large capacity oil pump and accessible vertical drive distributor incorporating full vacuum control of the ignition.

Body Strengthened—Strength has been added to the Ford body and frame, doubtless in answer to some complaints which have been received about doors flying open on rough roads due to twisting of structural elements. Rear bumper and bumper supports also have been ribbed for extra resistance to impact. Sun visors are wider, steering linkage operates more easily, doors have new rotary locks with pushbutton control of outside handles.

Plans call for holding the line on prices of the 1950 jobs, plus restoration of dealer discounts to 25 per cent, from 24 per cent. This may be the tipoff on what most of the industry is planning for next year: Restrict changes to minor mechanical and design details, avoid major outlays for new dies and tools and maintain present prices, in the hope that the savings on tooling expense will offset the expected added costs of materials, parts and labor resulting from pensions and upped social insurance. Most executives affirm there is almost no possibility of prices being lowered in the face of inflationary costs.

Plan Transmission Plant — After some hemming and hawing over whether it was true or not, Ford spokesmen have confirmed the company's plan to build a 400,000 sq ft single-story automatic transmission plant on a 55-acre industrial site on Red Bank road, east of Cincinnati's city limits. Quotations on equipment now are being taken, with deliveries specified next March. The division will join the Highland Park and Mound Rd. plants in Detroit, and the Canton, O., forging unit as a part of the company's general manufacturing division. The next addition to this division probably will be a die-casting unit to be set up in a recently purchased plant at Monroe, Mich.

One of the newer jobs assigned to the latter department is the die cast aluminum torque converter element of the new automatic transmission. The first experimental casting did not turn out so successfully, it is said, sticking so firmly in the mold it had to be barred out in little pieces. The design is intricate and difficult to die cast because of the many radial curved vanes. It may be necessary to change the technique and go to a permanent mold aluminum casting, with sand cores, such as is being produced for the converter of the Buick Dynaflow.

May Build Foundry — Engineers from the Ford production gray iron foundry are scouting around for a possible location on which to build

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if there is no facility now available which might be purchased and converted to furnish requirements for iron castings. An appropriation reportedly has been approved covering a three-year expenditure to set up foundry production on an expanded and more efficient basis. The present production foundry at the Rouge is cramped for space and castings demand has outgrown its stature, despite expenditure of several million dollars for rearrangement and modernization in recent years. Consideration was being given to the war-built plant of General Steel Castings Co. in Illinois, now idle, as a possible acquisition, and this still may be on the fire.

Pontiac To Close

HARRY J. KLINGLER, general manager of Pontiac, took his hair down for a few generalities about the past, present and future of his division at the recent preview of new models, to be announced late this week. Pontiac ran its last 1949 sedan off the line on the ninth and there were a few '50s coming along even then. As of that date there were 15,000 cars between the assembly line and dealers' floors, half of them still in transit. There is no great model-end inventory to be disposed of before taking orders for the new stuff. The division has been building upward of 7000 cars a week, so by the 25th dealers should be in excellent shape on old models. Meanwhile, steel supplies will justify production of less than 15,000, so the plant will shut down on the 23rd until metal inventories can be brought up to par. How long this will be Klingler could not state. He hinted three weeks might be a hopeful guess, and added that suspensions throughout the industry would be of longer duration than many persons were anticipating.

Changes Slight—Like Ford, Pontiac has confined changes to less noticeable details. This seems to confirm jelling policy in General Motors to run a body series for two years before effecting significant tooling revisions. Of course the basic 1941 body shell was run clear through 1949 without any important investment in new dies, but that period was an exception in that people would buy anything with four wheels and an engine.

1950 Run May Be Short—The possibility is seen that the 1950 model run for many producers may be a relatively short one, particularly if demand should fall shy of expectations. No one is expecting a repeat of the 1949 market, and everyone realizes it will be necessary to get out and sell. At the same time, there is little pessimism over the outlook. If the market should sag badly, then it might be expedient to rush through new tooling so that the 1951 models could be sprung in the late summer as was the practice prewar. This thinking applies primarily to the big three and not the independents like Nash, Studebaker, Hudson and Packard which have steered clear of dogging the footsteps of their larger competitors.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

	1949	1948
January	445,092	422,236
February	443,734	399,471
March	543,711	519,154
April	569,728	462,323
May	508,101	359,966
June	623,689	454,401
Six mos.	3,134,055	2,617,581
July	604,351	489,736
August	678,092	478,186
September	657,078	437,181
October	605,000*	516,814
November	.....	495,488
December	.....	514,337
12 mos.	.....	5,549,323

* Preliminary.

Estimate for week ended:

	1949	(Same week) 1948
Oct. 29	137,651	116,968
Nov. 5	116,699	118,229
Nov. 12	117,438	116,029
Nov. 19	115,000	120,718

Estimates by Ward's Automotive Reports

GM Cuts Big Melon

SANTA CLAUS dropped in early on the 400,000 General Motors stockholders and loaded their stockings with a whacking $4.25 per share year-end dividend which had many of the customers' men in brokerage offices goggle-eyed. They had been looking for something closer to $2, but if they had read the GM annual report carefully their surprise would have been less. The statement was made that directors were seeking an early return of a distribution of the prewar normal 85 per cent earnings to stockholders instead of the reduced rations of postwar years when expenditures for plant and equipment were running so high.

At any rate, the distribution of $192 million in dividends on Dec. 10 sets a new high for U. S. industry, and brings dividend payments for GM this year to $8. However, the amount pales alongside the estin federal tax bill for the year of million. Meanwhile, the corpor plans to retire $125 million in next month, wiping off all its term indebtedness. These notes sold in August, 1946, to eight insurance companies and did not ture until 1966 and 1976, be interest at 2½ per cent. Next GM likely will retire its $3.75 s preferred stock, also a postwar tation to reinforce working ca

Facilities in Good Shape—Ou of a multimillion dollar technical ter, the GM plant and equipme in good shape for peak produc with capacity of perhaps 12,500 and trucks a day, so future in ments for this account will be or less routine. Construction started on the first unit of the t nical center, a metallurgical buil which will house an experim foundry and metallurgical plants. This structure is 110 wide and 320 feet long. A ce area, 50 x 230 feet, will be the fo ry section, containing electric gas melting furnaces, plus a l molding and pouring floor. Spac available for a cupola, if it is cided to install one later. Some versations had been held with eq ment interests regarding the p bility of a small cupola capabl pouring continuously at a rate ton per hour but the idea was couraged.

Surrounding the foundry area, two floors, will be a complete ass ment of metallurgical equipme ovens, presses, quench tanks, x- machine, physical testing equipm metallographic laboratory, high-t perature testing, salt spray corro testing, humidity room, and d etching facilities.

Construction will start shortly the second unit of the center a 7 160 foot mechanical building pri pally an assembly and testing a for automotive engineering stud Two 50 x 275 foot wings will equipped with 36 engine test cell

Ford Attachments Shown

COMPLETE line of industrial equ ment designed for use with the F tractor was shown earlier this mo by Great Lakes Tractor & Equipm Co., Michigan distributor, at the co pany's headquarters in Birmingha Mich.

Representatives from industr and commercial fields along w custom operators, contractors members of local governments vie the demonstration of 35 pieces equipment.

Fastener appearance that contributes to the sales appeal of the final product—helps you get *True Fastener Economy*. The exceptionally fine finish of RB&W Cap Screws and Square Head Cup Point Set Screws is the product of more than a century of continuous research and progressive development in fastener manufacturing . . . backed by the skill of four generations of RB&W men and women.

R B & W

THE COMPLETE QUALITY LINE

Plants at: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill., Los Angeles, Calif. Additional sales offices at: Philadelphia, Detroit, Chicago, Chattanooga, Oakland, Portland, Seattle. Distributors from coast to coast.

104 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

Austin Gets Contract

For A. O. Smith Corp. of Texas large diameter welded steel pipe mill in Houston

CONSTRUCTION of the A. O. Smith Corp. of Texas large diameter welded pipe mill is being done by Austin Co., Cleveland. Work has already been started on the foundation.

A. O. Smith Corp., Milwaukee, and Armco Steel Corp., Middletown, O., whose Texas subsidiary — Sheffield Steel Corp.—will supply steel for the pipe from its adjacent mill, will be co-owners of the new Houston plant (STEEL, Oct. 3, p. 45).

Clearance of 33 feet will be maintained below the trusses in the plant. It will have two 80-ft craneway aisles each equipped with two 20-ton cranes and an intermediate 40-ft aisle, all extending the full length of the plant, 675 feet.

A pickling building, 80 x 200 ft, adjoining the larger structure, will be equipped with a 40-ton crane that will also serve a 330-ft crane runway. Trusses of Austin standard H-section welded design are being used throughout the plant which will require 1300 tons of structural steel. It will be enclosed with alternate bands of corrugated asbestos and steel sash above a 6-ft masonry sill wall. It will have a precast concrete floor.

A 40 x 200-ft steel frame and masonry office building is included in the contract.

McVoy Sheet & Tin Plate Sold

ONE of the oldest tin plate companies of its kind was bought by Korhumel-Heffron & Preiss Steel Co., Evanston, Ill.

Newton F. Korhumel, president of KHP, announced the acquisition of McVoy Sheet & Tin Plate Co., Chicago. The company was formed in 1877. It will be a division of the parent company. Fred Neilsen will continue to manage the McVoy Division as he has for many years.

Basalt Makes Heavy Shipments

BASALT ROCK Co., Napa, Calif., has begun heavy shipments of 20-in. welded steel pipe to Texas Eastern Transmission Corp. for construction of the pipeline from eastern Texas and Louisiana to eastern cities.

Basalt delivered a 60-car trainload of pipe, enough for 9½ miles of line. Other shipments will continue regularly. The pipe manufacturing project is a joint enterprise of Basalt and Kaiser Steel Corp. Plate for the pipe is supplied by Kaiser's Fontana, Calif., mill and formed and welded at Basalt's plant near San Francisco.

The operation is made possible by the fabrication-in-transit rate allowed by railroads. That permits steel from Fontana to be moved to Napa and then to point of use under one freight rate.

Basalt is erecting additional fabrication and welding facilities. Soon after the first of the year company officials expect they will be able to produce 30-in. diameter pipe in 40-ft lengths.

High Energy Fuels Research Lab

NEW LABORATORY to give expanded facilities for research in high energy fuels is being constructed in Cleveland for the National Advisory Committee for Aeronautics by H. K. Ferguson Co., industrial engineers and builders.

Scheduled for completion Dec. 1, the one-story building will contain four test cells, 12 chemical and physical laboratories, shops and utility rooms. The building is of structural steel, concrete and masonry construction.

It is designed to withstand explosive forces and insure safety of personnel. It is mechanically ventilated and is heated by radiant floor panels.

Bowen Sells to Besly

BOWEN Machine Co. of Beloit, Wis., sold its assets to Charles H. Besly Co. of the same city.

Kenyon Y. Taylor, vice presid of Besly, says the agreement give his company exclusive right the sale and manufacture of the Bowen "Quadrilateral Grinder." was developed and patented by A Bowen.

All personnel will be retained Besly under the directorship of Bowen who becomes general ma ger of the Bowen Division of Be Manufacturing and sales branc of the division will be located Beloit.

Mr. Bowen was formerly associa with Gardner Machine Co., a ma facturer of disc grinders in Beloit

Taps Sounded

TAPS were blown for the Lon Beach Naval Shipyard.

It happened earlier thi month when 5800 employees o the yard and representatives o veterans' groups "buried" th shipyard in a mock funera They did it to underline th seriousness to the nation o the closing of the yard. I will fold up June 30, 1950.

Uniformed veterans sounde "taps" at several strategic in tersections in Long Beach Calif. "Mourners" followed caisson bearing a black-drape casket through downtow streets. Reason for the closin is sweeping military econom orders that will necessitate re lease of more than 5000 civilia employees.

COMPLETE SERVICE UNIT: Mounted on wheels and ready to go anywh is this Model WC-20 White Super Power Truck. It carries full mast and equ ment for servicing oil wells. The special cab has an extra door and seat capacity for a full crew

riefs . . .

tional Steel & Shipbuilding Co., n Diego, Calif., purchased the ad-ning yards and facilities of Lynch ipbuilding Co. Plant and equipment ll be integrated with National.

—o—

o. P. Reintjes Co., Kansas City, .—sectionally supported refractory lls—appointed Charles T. Show, w Orleans, as sales representative Louisiana, lower Mississippi, south-Alabama and Florida. Interstate les Inc., St. Louis, will handle es in the St. Louis area. Frank yworth is president of Interstate.

—o—

user Machine Tool Corp., Manhas-, Long Island, N. Y., was appointed lusive U. S. factory representative S. Lambert, S. A., Solothurn leure), Switzerland.

—o—

tomatic Transportation Co., Chi-go—electric industrial trucks and nsporter motorized hand trucks—pointed James F. McCabe as its isiana and Mississippi sales rep-entative.

—o—

rtland Shingle Co., Portland, Oreg., pointed Balfour Guthrie & Co. Ltd. distribute Borgana, newest Port-d product, which prevents scale corrosion of boilers. Borgana will distributed in all the western tes, Alaska, British Columbia and waii through Balfour Guthrie West st offices.

—o—

tecoil Division of Kold-Hold Mfg. Lansing, Mich., appointed four tern representatives to help manu-turers with industrial heating blems. The new representatives : Paul B. Huyette Co. Inc., Phil-lphia; H. R. Houghton Co., Balti-re; W. B. Parsons Co., Boston; and ald B. Duff Co., Newark, N. J.

—o—

liams & Hussey Machine Co., Wil-, N. H.—special machinery and ar" gages—bought the assets of K. Tool Co., Shelton, Conn. O.K. l will operate as a division of the ent company.

—o—

rnational Silver Co., Niagara ls, Ont., will employ 100 addition-l workers when its new $150,000 nt extension is completed. The ition will be used for production flat ware.

—o—

rrow Mfg. Co., Wellston, O.—coal paration plants—changed its name McNally Pittsburg Mfg. Corp. rrow is a subsidiary of the latter pany, located at Pittsburg, Kans.

J. T. FRITZ

Horace T. Potts Co. opened a new steel warehouse in Baltimore. It is a departure for the 134-year-old company: From 1815 when Lukens Potts set up his first "iron store" to this year Potts had confined its stock to its Philadelphia warehouse. Increasing needs of southern industry resulted in the move. J. T. Fritz, a native of Baltimore, who headed the Potts southern office for many years, will be in charge of the new warehouse.

—o—

Kaiser Engineers Division of Kaiser Industries Inc. is in charge of the $35 million worth of additional facilities at the Fontana, Calif., plant. The division completed installation of $4.5 million worth of wire and cable making equipment at Permanente Metals Corp. aluminum plant in Newark, O., and a $2 million porcelain enameling plant for Kaiser Metal Products Inc. at Bristol, Pa.

—o—

Pasadena Steel & Supply Co., only steel warehouse in Pasadena, Calif., is doubling its plant facilities and adding to its truck fleet.

—o—

Cooper Alloy Foundry Co., Hillside, N. J., announces a stainless steel valve clinic to be held at William Penn Hotel in Pittsburgh, Thursday evening, Jan. 12, 1950. Admittance to the dinner-meeting clinic will be by invitation only. Tickets are free on a first come-first served basis.

—o—

Cerro de Pasco Copper Corp., New York, introduces a new alloy of reasonable hardness, negligible shrinkage and extensive melting range. It is "Cerrocast," a non-eutectic alloy of bismuth and tin. Cerrocast, the company says, is especially suitable in precision casting (lost wax process).

—o—

A. O. Smith Corp., Milwaukee, transferred the sales headquarters of its welding electrode and equipment division from Chicago to Milwaukee. The move was made to bring sales and customer service closer to the division's research and production facilities.

—o—

De Laval Steam Turbine Co., Trenton, N. J., appointed Superheater Co. Ltd. of Montreal, Que., to sell and service De Laval turbines, pumps, gears and compressors in Newfoundland, New Brunswick, Nova Scotia, Prince Edward Island and Quebec. Lefler Wymont Supply Co., Casper, Wyo., was appointed to represent De Laval in Wyoming and Montana. Roger Brown Co., El Paso, Tex., will represent the company in southern New Mexico and the southwestern corner of Texas.

—o—

Steel Founders' Society of America, Cleveland, emphasizes gains in steel foundry safety practice by an all-time record low in the industry's cumulative lost-time injury frequency rating. Of 132 steel foundries participating on an industry-wide basis, 39 qualified for highest honor awards when they made perfect safety records in the three-month competition.

—o—

Troy Engine & Machine Co.—steam engines, generating sets and generators—has acquired the colloid mill division of C. O. Bartlett & Snow Inc., Cleveland. Troy will shortly begin producing this type of equipment at its Troy, Pa., plant. A few weeks ago the company bought the roller mill and mixing equipment business of Brasington Corp., Cincinnati.

—o—

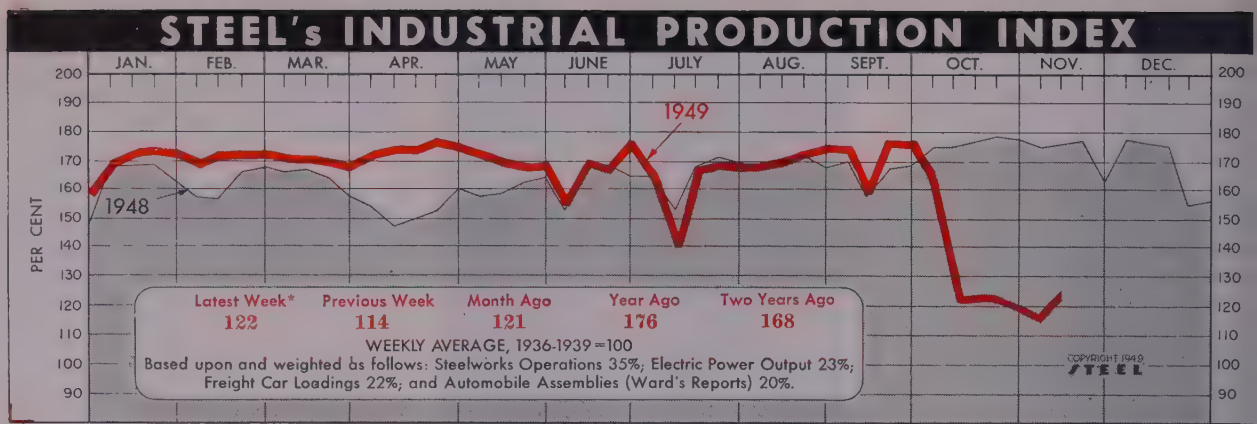
Logan Engineering Co., Chicago—lathes—will manufacture Dor-O-Matic controls. The Dor-O-Matic organization, Chicago, was merged with Logan.

—o—

Butterfield Division of Union Twist Drill Co., Derby Line, Vt.—taps, dies, reamers and special metal cutting tools—appointed Sminkey & Haas, Chicago, as a distributor.

—o—

Hydro-Line Mfg. Co., Rockford, Ill.—Hydro-Line air and hydraulic cylinders and special machinery—appointed Austin-Hastings Co. Inc., Cambridge, Mass., as exclusive representative in New England, excluding Connecticut.


STEEL's INDUSTRIAL PRODUCTION INDEX
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
PER CENT
1949
1948
Latest Week* 122
Previous Week 114
Month Ago 121
Year Ago 176
Two Years Ago 168
WEEKLY AVERAGE, 1936-1939=100
Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 20%.
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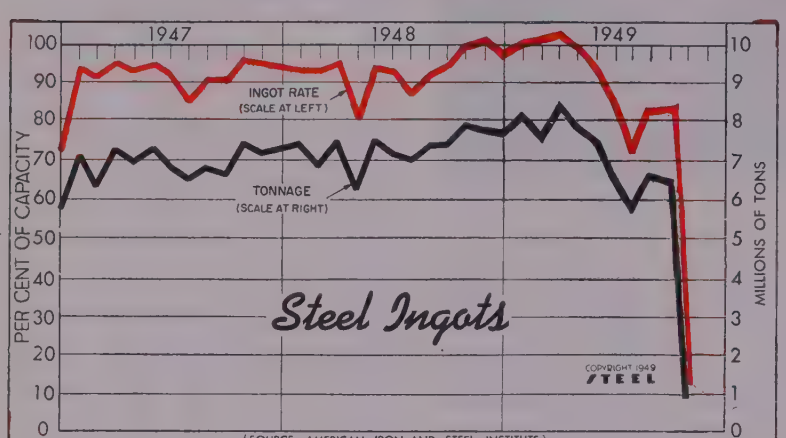
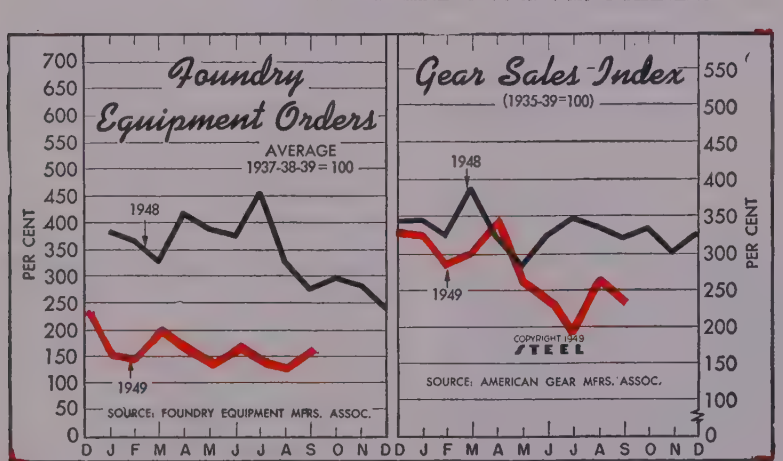
*Week ended Nov. 12 (preliminary).



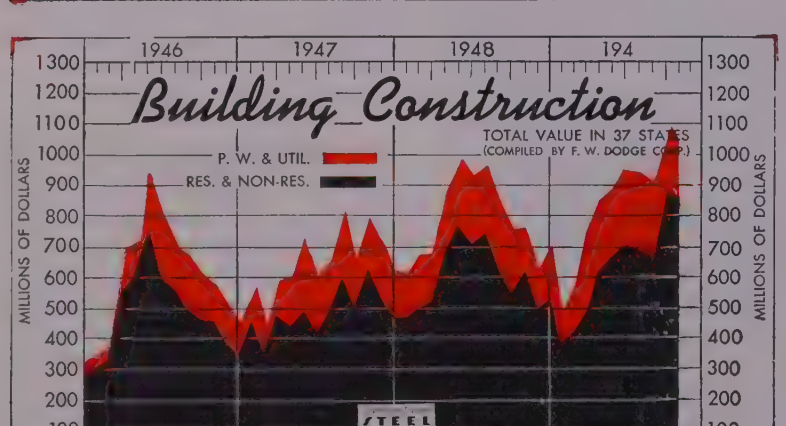
Steel Ingots

	Production (Net Tons—000)			Operating Rate (% of Capacity)		
	1949	1948	1947	1949	1948	1947
Jan.	8,183	7,473	7,213	100.2	93.6	93.2
Feb.	7,481	6,940	6,422	101.4	93.0	91.9
Mar.	8,388	7,608	7,307	102.7	95.3	94.4
Apr.	7,785	6,218	7,043	98.4	80.4	93.9
May	7,590	7,572	7,329	92.9	94.8	94.7
June	6,498	7,256	6,969	82.2	93.8	92.9
July	5,779	7,067	6,570	70.9	88.7	85.1
Aug.	6,715	7,438	6,982	82.2	93.1	90.2
Sept.	6,592	7,416	6,789	83.5	96.1	90.8
Oct.	917	7,987	7,560	11.2	100.0	97.7
Nov.	....	7,787	7,233	....	100.7	96.5
Dec.	....	7,771	7,366	....	97.5	95.4
Total	....	88,534	84,784 Ave.	....	94.0	93.0



	Foundry Equipment Orders* —Index— (1937-38-39=100)		Gear Sales —Index— (1935-39=100)	
	1949	1948	1949	1948
Jan.	149.9	380.9	320.7	346.8
Feb.	144.4	367.3	282.3	324.4
Mar.	190.8	326.2	299.1	389.8
Apr.	172.0	412.0	339.0	320.9
May	121.9	388.5	250.1	283.6
June	164.9	376.8	227.8	324.1
July	146.6	456.3	193.1	348.4
Aug.	127.1	324.7	262.0	335.6
Sept.	166.6	273.5	224.9	320.4
Oct.	....	296.0	....	333.3
Nov.	....	284.4	....	309.0
Dec.	....	243.7	....	325.9

* By foundry trades only.



Construction Valuation in 37 States

(Unit—$1,000,000)

	Total	Public Works, Utilities		Residential and Non-residential	
	1949	1949	1948	1949	1948
Jan.	483.0	102.0	136.6	381.0	478.6
Feb.	568.5	153.5	177.3	415.0	504.6
Mar.	747.6	168.4	164.3	579.2	525.5
Apr.	842.6	222.4	184.7	620.2	689.2
May	880.3	213.5	205.0	666.9	765.8
June	945.7	239.0	215.7	706.7	719.5
July	943.6	252.7	217.9	690.9	744.8
Aug.	905.7	234.3	207.8	671.5	646.3
Sept.	1,093.7	223.1	202.7	870.6	559.5
Oct.	1,061.8	204.0	165.5	857.8	613.1
Nov.	....	....	106.9	....	504.3
Dec.	....	....	170.9	....	523.1
Total	....	....	2,155.3	....	7,274.4

The Business Trend

INDUSTRIAL production took its first step along the comeback trail in the week ended Nov. 12 as STEEL's industrial production index advanced 8 points from the level of the preceding week to 122 per cent (preliminary) of the 1936-1939 average. The index for the latest week is 1 point higher than a month ago but still 39 points below the last prestrike week.

STEEL — Output of steel for ingots and castings moved up to 24 per cent of capacity in the week ended Nov. 12 from 12 per cent a week earlier and was responsible for the rise of the overall index. In the current week the rate rise will be much higher as the list of companies which have come to terms with the steel workers' union includes most of the industry's capacity. The increased rate will fall short of the prestrike rate by a wide margin as the industry must effect sizable repairs before all furnaces are ready to go.

AUTOMOBILES — Outturn of passenger cars and trucks improved to 117,438 units in the week ended Nov. 12 from 116,699 in the preceding week. In the current week the 6 millionth vehicle for 1949 is due to come off either a U. S. or Canadian assembly line. Weekly assembly totals are expected to decline in the latter part of this month and in December with a number of plant closings in the offing because of a pinch for certain steel items. Several builders have already begun production of 1950 models in order to have some cars available for dealer showings even though continuous full scale production of new models with present steel stocks is impossible.

COAL—Bituminous coal output will increase because of the armistice in the coal dispute. The latest figures available, however, are for the week before the strike was temporarily settled and show a total of 2,680,000 tons mined in the week ended Nov. 5. This total is about the same as in other weeks during the strike and far below the 10,704,000 tons produced in the corresponding week last year.

PRODUCTION—Federal Reserve Board says a special adjustment will be made in its industrial production index for October, bringing the seasonally adjusted figure up to 162 per cent of the 1935-1939 average. If computed by the usual method the figure would be 155 per cent. The reason for the adjustment is that output of pig iron and steel ingots is used to represent output in the heating equipment, hardware and other fabricating industries in the iron and steel group. In October activity in these lines was largely maintained despite the strike. The board believes use of the index computed in the normal manner would overstate the decline in indexes for: Iron and steel, durable goods and total.

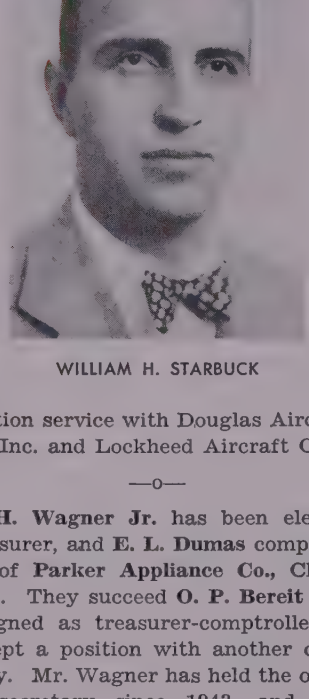
TRUCKLOADINGS—American Trucking Associations totals show volume of freight transported by motor carriers in September increased 2.1 per cent over August and 8.4 per cent over September, 1948. Motor carriers hauled an aggregate of 3,864,112 tons in September, compared with 3,785,237 tons in August and 3,564,999 in September a year ago.

BAROMETERS of BUSINESS

		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	24.0	12.0	8.0	99.0
	Electric Power Distributed (million kilowatt hours)	5,435	5,435	5,481	5,571
	Bituminous Coal Production (daily av.—1000 tons)	447	462	385	1,784
	Petroleum Production (daily av.—1000 bbl)	5,185	5,136	5,044	5,675
	Construction Volume (ENR—Unit $1,000,000)	$111.3	$169.9	$143.7	$137.8
	Automobile and Truck Output (Ward's—number units)	117,438	116,699	146,566	116,029
	*Dates on request. †1949 weekly capacity is 1,843,516 net tons. 1948 weekly capacity was 1,802,476 net tons.				
TRADE	Freight Car Loadings (Unit—1000 cars)	589†	579	584	872
	Business Failures (Dun & Bradstreet, number)	222	196	172	96
	Money in Circulation (in millions of dollars)‡	$27,528	$27,382	$27,546	$28,337
	Department Store Sales (changes from like wk. a yr. ago)‡	—2%	—7%	—11%	—8%
	†Preliminary. ‡Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$11,221	$14,010	$10,477	$13,350
	Federal Gross Debt (billions)	$256.8	$256.9	$256.5	$252.4
	Bond Volume, NYSE (millions)	$12.2	$18.7	$14.1	$17.8
	Stocks Sales, NYSE (thousands of shares)	4,317	7,226	6,225	6,972
	Loans and Investments (billions)†	$66.7	$66.8	$66.1	$62.2
	United States Gov't. Obligations Held (millions)†	$37,401	$37,838	$37,252	$33,268
	†Member banks, Federal Reserve System.				
PRICES	STEEL's Weighted Finished Steel Price Index††	152.52	152.52	152.52	151.86
	STEEL's Nonferrous Metal Composite‡	171.6	170.6	170.6	228.8
	All Commodities†	151.5	151.4	152.1	164.3
	Metals and Metal Products†	169.3	168.8	169.2	172.9
	†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				

Men of Industry

HARRY C. PLATT



WILLIAM H. STARBUCK

Harry C. Platt has been appointed vice president of Engineered Castings Division, and **William H. Starbuck,** vice president of Kellogg Division, **American Brake Shoe Co.,** New York. Mr. Platt, formerly works manager, has been with the company since 1942. Mr. Starbuck, formerly assistant general sales manager, served in the sales departments of other divisions of the company before joining the Kellogg Division. **William J. Grant** has been appointed manager of southern sales, National Bearing Division. His headquarters will be in the Southern States Bldg., Richmond, Va. He was formerly sales representative for the company's Brake Shoe & Castings and Southern Wheel Divisions.

—o—

F. R. Wilkes has been appointed a sales engineer in the Chicago area for **Simonds Abrasive Co.,** Philadelphia, and **K. R. Bartholomew** as a sales engineer in the eastern Pennsylvania and northern New Jersey territory.

—o—

T. E. Anderson has been appointed Chicago district sales manager, **Ohio Ferro-Alloy Corp.,** Canton, O., succeeding the late **B. A. Patch Jr.** Mr. Anderson has been handling the central district sales out of the main office at Canton.

—o—

H. F. Finnell Jr. has been named Pacific Coast sales manager for **Phelps Dodge Copper Products Corp.,** and will have headquarters in Los Angeles.

—o—

Joseph H. Moore has been appointed plant superintendent for **Vic Pastushin Industries Inc.,** Los Angeles. He has a background of 21 years in the aircraft industry, including production service with Douglas Aircraft Co. Inc. and Lockheed Aircraft Corp.

—o—

C. H. Wagner Jr. has been elected treasurer, and **E. L. Dumas** comptroller of **Parker Appliance Co.,** Cleveland. They succeed **O. P. Bereit** who resigned as treasurer-comptroller to accept a position with another company. Mr. Wagner has held the office of secretary since 1943, and was elected vice president in 1945. Mr. Dumas was previously associated with Kennametal Inc. as comptroller, which position he assumed in 1945.

—o—

Carl T. Doman has been appointed to the staff of **L. D. Crusoe,** vice president and general manager of Ford Division, **Ford Motor Co.,** Dearborn, Mich., to assist on forward products planning. He has resigned from Air-cooled Motors Corp., Syracuse, N. Y., where he was vice president and chief engineer.

—o—

Herbert P. Grenda, for the last two years with the public relations staff of **General Motors Corp.** in New York, has been named regional manager of public relations for the Detroit region, replacing **Leroy E. Cowles,** named public relations director for General Motors Truck & Coach Division at Pontiac, Mich.

—o—

Charles F. Wagner has been appointed consulting engineer for **Westinghouse Electric Corp.,** Pittsburgh, in the central station and power fields. **J. L. Cross** was appointed manager of power transformer sales for the Transformer Division at Sharon, Pa., succeeding **C. H. Bartlett,** recently made sales manager for the entire Transformer Division. **Thoma Daly** has been appointed enginee manager in charge of all Naval nance work of the corporation Sharon. **John E. Payne** was appoi manager of the central district, headquarters at Pittsburgh.

—o—

Penn-Harris Steel Co., Harrisb Pa., iron and steel distributor, elected **M. J. Sweeney Jr.,** presid **Stanley Hughes,** vice president treasurer; **R. W. Emmerling,** president; and **G. V. Strong,** se tary.

—o—

Detrex Corp., Detroit, has ele **Robert L. Murray** as a director. Murray is also executive vice pr dent and a director of Hooker-E trochemical Co., Niagara Falls, N. and vice president and director Hooker-Detrex Inc., subsidiary jo ly owned by the Hooker and Det companies.

—o—

Joseph Gangler has been appoin sales and engineering representat of **Snyder Tool & Engineering** Detroit. He was in the master m chanics division of Chrysler Cor engineering department for 23 yea and was a member of the Cross C sales and engineering department five years. He has been assigned the Detroit territory.

—o—

National Metal Products Co., Pit burgh, announces promotion of **Jose T. Croyle Jr.** to eastern division sa manager. For the last three yea Mr. Croyle has represented the co pany in Ohio, western Pennsylva and parts of Maryland, West Virgi and Kentucky.

—o—

Yarnall-Waring Co., Philadelphia, a nounces that **John A. Steer,** forme district manager of the Philadelp territory, has been appointed N York district manager, succeedi **Harold S. Webster,** retired. **J. Ambler** has been appointed sales re resentative in the Denver district.

—o—

Eugene P. Berg, formerly gene superintendent, **Link-Belt Co.,** C cago, has been appointed to the ne ly created position of assistant g eral manager of the Pershing plant in Chicago. **Richard Moy** formerly superintendent of the st shop, has been appointed gene superintendent, manufacturing partment of the Pershing Rd. pla Other appointments at the plant

Is UPKEEP COST your magnet problem?

Although it looks and lifts like new, this Ohio Magnet is actually 22 years old. Until recently, upkeep cost was zero. Then a ground developed in the terminal box and the magnet was shipped to our plant, where repairs were quickly completed without disassembly.

Upkeep cost? Under $100—*less than $5 a year for 22 years!*

Next time you buy a lifting magnet, remember that heavier construction assures extra years of low-cost life. Send your order to Ohio—*25 years a leader in magnetic materials handling.*

This magnet averaged less than $5 a year!

OHIO PROTECTO-WELD MAGNET is welded *on top*, where weld cannot be dented in. Sizes include 39, 46, 55 and 65-inch diameters. Ohio also builds magnet control equipment.

THE OHIO ELECTRIC MFG. CO. • 5900 MAURICE AVENUE • CLEVELAND 4, OHIO

Ohio MAGNETS

clude **Stanley F. Zale,** superintendent of the steel shop; **Ray Witt,** supervisor of time study and methods department; and **Harold Hartman,** chief inspector.

—o—

James K. Louden, vice president and assistant to the president, **York Corp.,** York, Pa., was presented the Gilbreth Award for his contributions to the advancement of scientific management at the annual banquet of the Society of Advancement of Management at Hotel Statler, New York, Nov. 3.

—o—

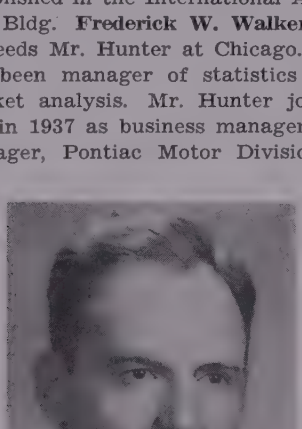
Wisconsin Scrap Iron Dealers Association re-elected as officers **Al Hammerschlag,** H & H Scrap Iron & Metal Co., Wauwatosa, Wis., president; **Zeke Afram,** Afram Bros., Milwaukee, vice president; **Tom Grossman,** Grossman Bros. Co., Milwaukee, secretary; and **Hy Schiffman,** Hy Schiffman Co., Milwaukee, treasurer.

—o—

Chester A. MacChesney has been elected chairman of the board of **Acme Steel Co.,** Chicago, to fill the vacancy of chairman caused by the death of **Charles S. Traer.** Mr. MacChesney joined the company in 1916, and since 1948 has been executive vice president. He has been a director since 1923.

—o—

Robert E. Hunter, Chicago district sales manager, Electro-Motive Division, General Motors Corp., has been named director of sales of the newly formed **General Motors Diesel Ltd.,** London, Ont. He will have headquarters in Montreal, Que., where the company's sales offices have been established in the International Aviation Bldg. **Frederick W. Walker Jr.** succeeds Mr. Hunter at Chicago. He has been manager of statistics and market analysis. Mr. Hunter joined GM in 1937 as business management manager, Pontiac Motor Division.



ROBERT E. HUNTER

G. K. EGGLESTON

G. K. Eggleston has been elected vice president in charge of manufacturing, and **S. E. Gregory** was appointed general sales manager, **Non-Ferrous Perma Mold Inc.,** new corporation manufacturing permanent-mold castings and jointly owned by Barnes Mfg. Co., Mansfield, O., and Non-Ferrous Die Casting Co. Ltd., London, England. Mr. Eggleston, since 1941 a vice president of engineering with Barnes Mfg. Co., was previously chief metallurgist, Detroit Lubricator Co. Mr. Gregory has been with Non-Ferrous Die Casting Co. Ltd. in London.

—o—

Ziegler Steel Service Co. has appointed as sales representatives **Bart Smith,** to handle East Los Angeles, Calif., Pasadena, Alhambra and east through Riverside; and **Edward W. Fisher,** to handle the downtown Los Angeles and southeastern industrial areas. Mr. Smith has been associated with A. M. Castle Co., United States Steel Supply Co.; and Gilmore Steel & Supply Co.; and Mr. Fisher was associated with Ducommun Metals & Supply Co., Gilmore Steel & Supply Co. and Victor Equipment Co. He will be available for consultation on welding problems.

—o—

William Rausch has been promoted to assistant sales manager of **Rapids-Handling Equipment Co.,** Buffalo. He joined the firm in 1946 as a salesman. He spent four years in a supervisory position at Chevrolet Motor & Axle Division, General Motors Corp., and a year at Aluminum Co. of America in service engineering. In addition to his new supervisory duties, Mr. Rausch will continue selling the complete Rapistan material-flow line of gravity and power belt conveyors, hand and floor trucks, and flame-hardened industrial casters.

—o—

The **San Francisco** section of the

S. E. GREGORY

American Welding Society announ installation of the following office **H. E. Rhoades,** chairman; **S. Edwards,** first vice chairman; **R. Labagh,** second vice chairman; **E. Bartz,** treasurer, and **A. C. Schwa** secretary.

—o—

E. L. McReynolds has been appoin sales engineer specializing in the s of alloy and stainless steel strip **Sharon Steel Corp.,** Sharon, Pa. was recently with Morse Chain Co. Ithaca, N. Y., and had previou been with Republic Steel Corp. Massillon, O.

—o—

George G. Gallagher has been pointed assistant manager, raw m terials operations office, U. S. Ato Energy Commission, Washington. replaces **Jesse C. Johnson,** recen made deputy manager.

—o—

Paul M. Baurle has been elected rector of service for **Kiekhaefer Co** Fond du Lac, Wis. He joined firm in 1945 and for the last f years has guided the service edu tional program under which the c poration has provided factory tra ing for its Mercury outboard mo dealers and distributors.

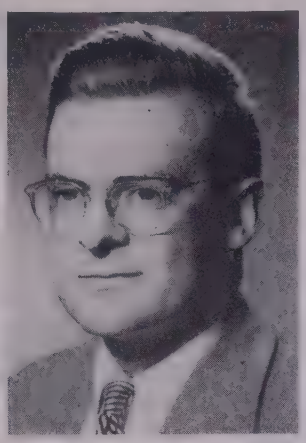
—o—

C. D. Kuck has been appointed g eral sales manager, **Highway Trai Co.,** Edgerton, Wis. He has b senior analyst of George S. May C and before that was with Reyno Metals Co.

—o—

Ray P. Johnson has been appoin administrative assistant to **G. Shallberg,** executive vice president **Borg-Warner Corp.,** Chicago. In dition to his new duties Mr. John will retain his post as vice presid of Morse Chain Co., division of Bo Warner. He is also a director of Borg-Warner Corp.

GORDON F. EATON



WALTER M. CHARMAN JR.

Gordon F. Eaton and **Walter M. Charman Jr.** have been elected vice presidents of **Ferro Engineering Co.,** Cleveland. **Courtney Burton,** vice president, Oglebay Norton & Co., succeeds his uncle, the late **Crispin Oglebay,** as a director of Ferro. Mr. Eaton went to Ferro Engineering Co. from Wheeling Steel Corp. in 1934, starting as a sales and service engineer, and in 1942 was made sales manager. Mr. Charman joined the company in 1946 as a sales and service engineer.

—o—

E. H. Mahnke has been appointed assistant managing director, and **K. B. Jacobsen** as West Coast secretary, **Liquefied Petroleum Gas Association,** Chicago. Mr. Jacobsen succeeds **Don McNary,** who resigned from the West Coast post to accept a position with Calor Gas Co., Oakland, Calif.

—o—

Donald H. McLaughlin has been elected president, **American Institute of Mining & Metallurgical Engineers** for 1950. He is president of the Homestake Mining Co. Elected vice presidents of the institute are **Andrew Fletcher,** president, St. Joseph Lead Co., New York; and **Robert W. Thomas,** general manager, Nevada Consolidated Copper Corp., Ray, Ariz.

—o—

D. M. Laflin has been appointed general sales manager, **Giddings & Lewis Machine Tool Co.,** Fond du Lac, Wis. He began his career in the machine tool industry in a sales engineering capacity for Cincinnati Milling Machine Co., Cincinnati, in 1927. For the last 16 years he has been general sales manager for Giddings & Lewis' eastern territory with headquarters in New York.

—o—

William H. Kilkenny has been appointed general manager of the southern California retail store of **Hyster Co.,** Portland, Oreg. He has been a materials handling field consultant for Hyster.

—o—

Luria Bros. & Co. Inc., Philadelphia, announces promotion of **Dale F. Fahrendorf,** who will work directly under **Jack L. Gordon,** company's southwestern district manager. Mr. Fahrendorf transfers from Chicago to St. Louis.

—o—

Wayne H. Hunter has been transferred to St. Louis as territory representative, Republic Rubber Division, **Lee Rubber & Tire Corp.**

—o—

Henry F. Pojman has been appointed personnel manager of **Thor Corp.,** Chicago, succeeding the late **Alistes Leonard.**

—o—

Fairbanks, Morse & Co., Chicago, announces the following appointments: **A. C. Traub,** manager of dealer sales in Los Angeles, has been transferred to the stoker division with headquarters in Chicago, where he succeeds **F. J. Kluempers,** transferred to the general dealer sales division. **Russell A. Stevens,** diesel department manager, Los Angeles branch, appointed manager, Boston Branch House, succeeding **V. O. Harkness** who assumes the duties of diesel sales department manager for the Boston area. **Harold D. Gobble,** manager of the oil field division, appointed manager, Dallas Branch House, succeeding **Harry J. Renken,** transferred to Chicago as oil field division manager.

—o—

Dr. Frank B. Jewett, former president, National Academy of Sciences, will be awarded the **Hoover Medal for 1949** by the American Society of Chemical Engineers, American Society of Mechanical Engineers, American Institute of Mining Engineers, and American Institute of Electrical Engineers. It will be conferred at the general meeting of the latter society, which will be held Jan. 30 to Feb. 3, 1950, in New York.

—o—

M. Carter Strickland has been elected president and treasurer, **Smith-Lee Co. Inc.,** Oneida, N. Y., to succeed the late **Harvey M. Smith.**

—o—

Ernest Holme has been promoted to superintendent of the Indiana Harbor rolling mills of **Youngstown Sheet & Tube Co.,** East Chicago, Ind., succeeding **J. M. Mitchell.**

—o—

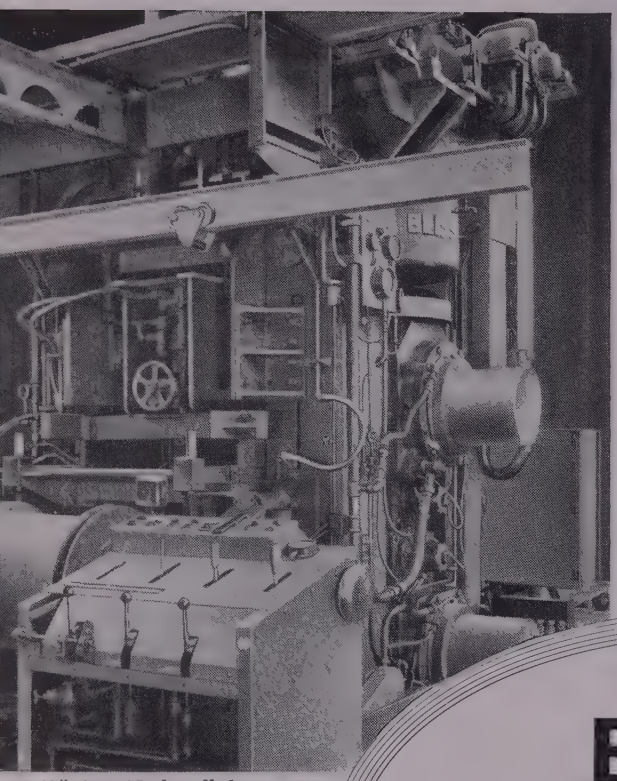
Elastic Stop Nut Corp. of America, Union, N. J., has appointed **Donald B. Sorenson** of Milwaukee as sales engineer in charge of the Wisconsin and Minnesota area.

—o—

Bernard Lester, long active in the machine tool refresher course and originator of the Westinghouse Machine Tool Forum, **John A. Silver** and **Frank W. Hankins** announce formation of the management engineering firm of **Lester, Hankins & Silver.** Specializing in management, distribution and sales problems of manufacturers and distributors of machinery, equipment and technical products, the company has offices at 1605 Race St., Philadelphia, and 140 Cedar St., New York. Mr. Lester was assistant manager of industrial sales, Westinghouse Electric Corp.; Mr. Silver was director and executive vice president, F. J. Stokes Machine Co.; and Mr. Hankins for the last 10 years has headed the marketing counseling firms of Frank W. Hankins and Hankins, Borie & Associates. He had former association with Columbian Rope Corp. as chief engineer, and Worthington Pump & Machinery Co., where he was manager of the marketing department.

BERNARD LESTER

Bliss Rolling Mills Meet the Tes
of Severe Usage at Alco



42" Four-High mill showing cone type payoff.

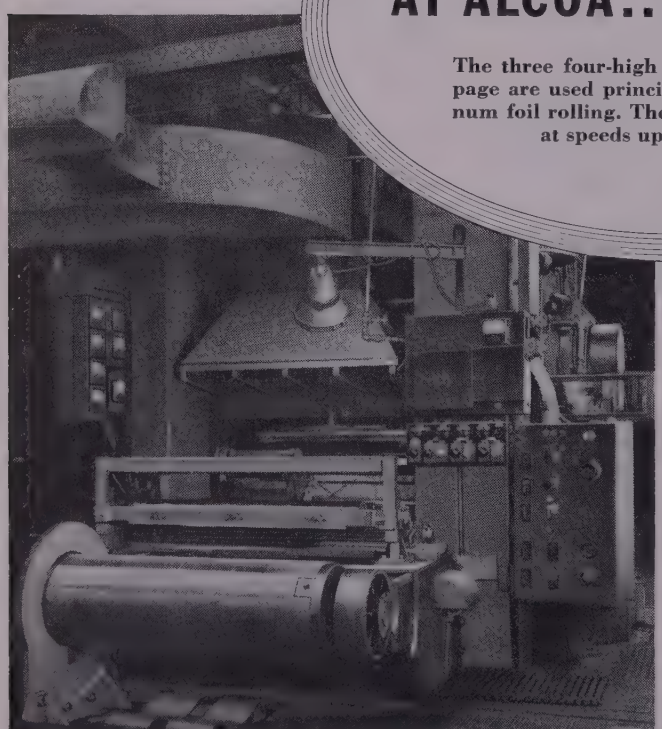
Whether it's strip, sheet or foil, hot or cold working, you will fi Bliss Rolling Mills and Accessories meeting exacting standa throughout the various plants of the Aluminum Company America. Illustrations of various four-high mills installed in Alc plants at Edgewater, New Jersey and Davenport, Iowa are sho on these pages.

With non-ferrous and ferrous metal producers alike, Bliss Ro ing Mill engineers concentrate on the design of equipment, co bining the speeds and controls required with the rigidity a accessibility necessary for long trouble-free service.

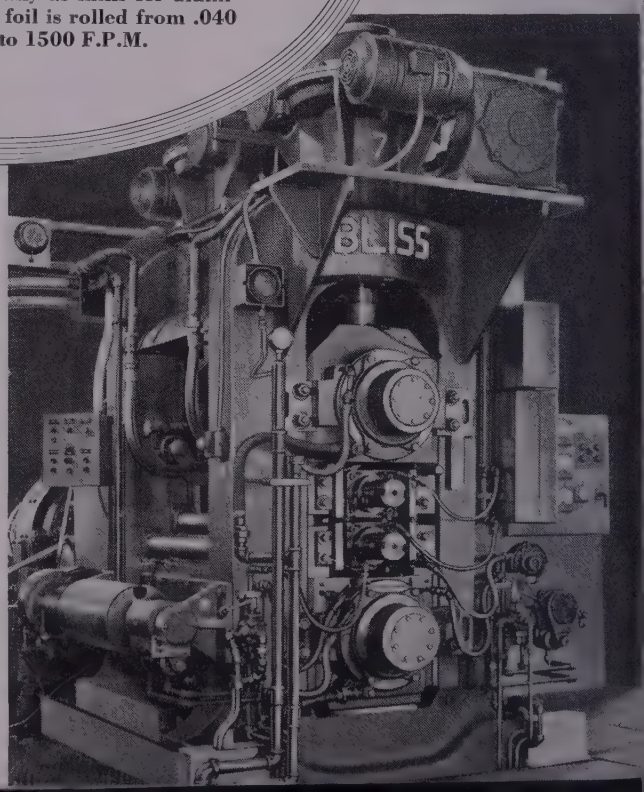
For the engineered refinements that make for maximum pr duction—for the rugged rolling mill performance you want, p your problem up to Bliss. You'll get the same keen counsel tha made Bliss the first name in presses for more than 90 years.

BLISS
AT ALCOA...EDGEWATER

The three four-high mills illustrated on this page are used principally as mills for aluminum foil rolling. The foil is rolled from .040 at speeds up to 1500 F.P.M.



60" Four-High mill with tension reel, stripper, coil buggy and outboard bearing.



34" Four-High mill, one of four installed.

Production AND Engineering NEWS AT A GLANCE

SERVICE PLUS—New type conveyor belt for conveying hot materials developed by Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, already has provided over 14 months' service in a large foundry installation where hot shakeout sand at temperatures up to 400° F is carried. According to O. S. Dollison, vice president and general manager, 10 weeks' service normally is considered good performance for regular belts. Carcass of the new belt is constructed of multiple plies of glass fabric plus covers specially compounded to resist heat.

ULTRASONIC DEGREASING—A device still in the experimental stage promises to turn degreasing operations in many plants into a 10-second job. Developed by Massa Laboratories Inc., Cleveland, the electrical unit accomplishes its mission of degreasing steel parts by generating ultrasonic waves at the rate of 33,000 per second in an ordinary caustic solution. Steel also can be descaled in about the same time although removal of black oxide takes a little longer under some conditions. The sound waves, when projected into the solution, agitate molecules of the solution with such tremendous force that steel surfaces are scrubbed cleaner than they would be by 20 minutes of boiling.

PERFORATED PLATES ADD STIFFNESS—Perforated steel cover plates for bridge columns contribute to the strength, and especially to the stiffness of the columns built up from the plates and angles, according to studies completed by National Bureau of Standards, Washington. Formulas derived, it is reported, may be applied whenever data are required concerning displacements in a structure having perforated members. Validity of the formulas are confirmed by experiment. It also was discovered that the net area of a perforated-plate column may be used safely for design purposes even for a perforation shape that produces great stress concentration.

SELF-REGULATING PLATING SOLUTION—Cathode efficiency of a new plating solution developed by United Chromium Inc., New York, is so high that deposits equal in thickness to those provided by conventional methods can be obtained in less time. Besides being self-regulating, the solution offers better covering power and a wider bright plating range. It also is less sensitive to interruptions in current. When plated over nickel, it has less tendency to produce "rainbow plate" at the line where the chromium stops. According to the company, the solution can be used satisfactorily with standard plating equipment.

MAKES PERMANENT BOND—Permanent bond of aluminum on steel is now possible by means of a process developed by Richard S. Reynolds, Richmond, Va. Adhesive method of coating the light metal on steel is accomplished by use of a fine iron coating on the steel—deposited electrolytically as a bonding agent. Briefly, process consists of passing steel strip from a roll continuously through a cleaning bath, electrolytic bath to receive the iron coating, a furnace to heat it to about 850° F and finally between two strips of aluminum foil between high-pressure rollers where the bonding is effected. The plated steel then can be further rolled to reduce its thickness, if desired.

X-RAY "RULER" — Nondestructive method for measuring thickness of tin coatings on steel, revealed at the Electrochemical Society meeting in Chicago, is based upon the absorption by the coating of secondary x-rays excited in the base metal by an x-ray beam. One of the most valuable applications of the technique is for recording and controlling continuously amount of tin coating applied to steel by the electrolytic process. (p. 82)

NO MAGIC CURE—Until recently it was believed temper brittleness occurred only in alloy steels, and that the alloys were in some way responsible. This belief was based on evidence that there was little if any difference in toughness at any test temperature between specimens of plain carbon steels given a treatment to bring out temper brittleness, and those simply quenched from the draw. It now seems doubtful that this evidence was properly interpreted. In fact, cause of temper brittleness still is not known, and no magic drug to prevent it is known either. Certain measures, however, can be taken to reduce the action to a point of unimportance. (p. 86)

INGOT HEATING—Absolutely accurate readings of ingot temperatures are guaranteed in the newly installed battery of eight tangentially-fired circular soaking pits of Allegheny Ludlum Steel Corp., Brackenridge, Pa. Thorough ingot heating to predetermined temperatures is within plus or minus 10° F. Pits are staggered in two rows of four each. Each furnace is capable of handling 60 to 65 tons of ingots per load. (p.90)

SHRINKING ASSET—During peace times, demand for iron ore fluctuates widely over the years. But during the late war, production to meet peak demand was smoothly increased from 13 million tons in 1938 to 70 million in 1942. To increase production from the great Mesabi pits it was only necessary to add a few shovels and a few more men to work. Five thousand men produced 13 million tons in 1938 and 11,000 produced 70 million tons in 1942. The increase was accomplished without any fuss or commotion, or government subsidy. Exhaustion of the great Mesabi range means this flexibility will be gradually lost to the nation. (p. 96)

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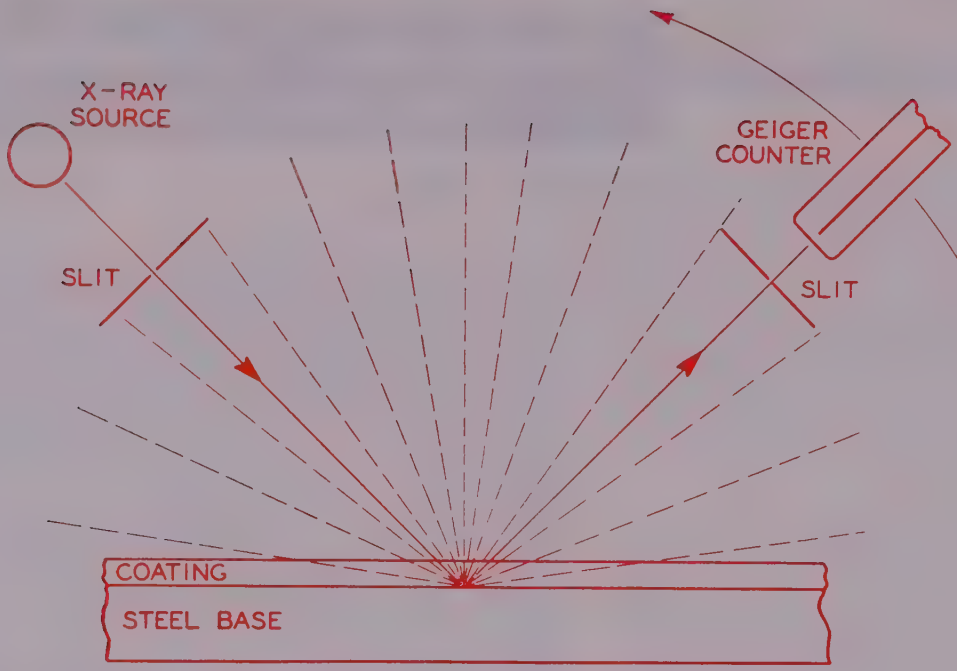
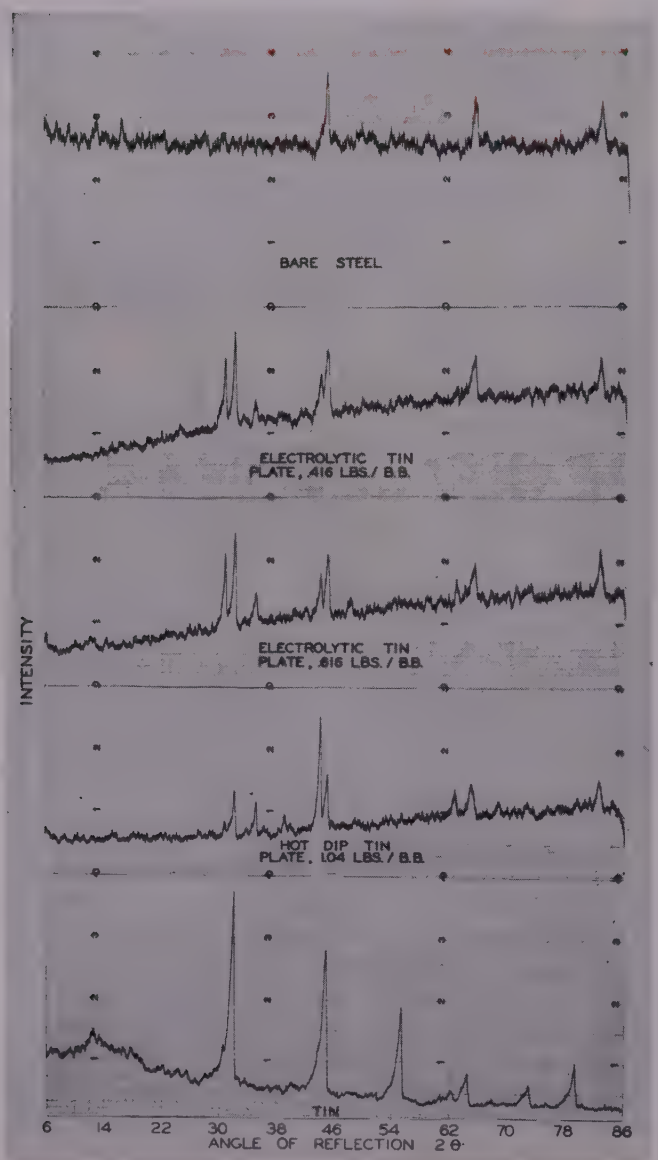
IMPROV



X-ray method for determining thickness of tin coating on steel, recent advances in tin, chromium and alloy plating, various corrosion processes were discussed at the society's 96th meeting


BARE STEEL
ELECTROLYTIC TIN PLATE, .416 LBS./ B.B.
ELECTROLYTIC TIN PLATE, .816 LBS./ B.B.
HOT DIP TIN PLATE, 1.04 LBS./ B.B.
TIN
INTENSITY
6 14 22 30 38 46 54 62 70 78 86
ANGLE OF REFLECTION 2θ

A BALANCED agenda of technical papers in whi were described new developments in tin platin chromium plating, and various corrosion process was featured at the 96th meeting of the Electrocher ical Society at Chicago, October 12-15. Methods f plating molydenum, and recent advances in alloy pla ing and theory of plating processes were among t other highlights of the electrodeposition symposiu featured as a part of the general meeting.

X-ray Measuring Tin Coating — A nondestructi method for measuring thickness of tin coatings steel was described by H. F. Beeghly, Jones Laughlin Steel Corp., Pittsburgh. The procedure based upon absorption by the coating of secondary rays excited in the base metal by means of an x-ra beam; accuracy is comparable to that of convention methods. Potentially one of the most valuable a plications of the technique is for the continuous r cording and control of the amount of tin coating a plied to steel by the electrolytic process. It was state that the principle of this method has been used fo the construction of units now in experimental us on the electrotinning lines at J & L.

According to Beeghly, a specimen irradiated b x-rays becomes a secondary source of energy whe exposed to radiation less than some critical wave length. When such conditions occur, the specime is said to "fluoresce" and this secondary radiatio is emitted in all directions, as illustrated in Fig. 1 which shows a schematic arrangement for measurin coating thickness by absorption of fluorescent x radiation. Secondary radiation from the specime

Fig. 1 (top)—Schematic arrangement for measuring coating thickness by absorption of fluorescent x-radiation

Fig. 2 (left)—X-ray curves obtained with copper K radiation on representative samples of tin plate which show a variation in intensity related to coating weight

ATING
nd CORROSION PROTECTION

. . . to result from new developments revealed at Electrochemical Society meetings

s generally considered objectional in conventional -ray diffraction work since it raises the background vel and tends to obscure the pattern of constituents the specimen being studied. Therefore, it is avoided herever possible by choice of an x-ray target ma- rial whose radiation is of a wave-length that will ot produce "fluorescence" of the given specimen.

Secondary Radiation Used—In the experimental ork conducted at Jones and Laughlin laboratories was found that this secondary radiation (back- round) could be used to good advantage as a source radiant energy for measuring the thickness of etallic coatings on steel. The procedure is not sub- ct to some of the limitations imposed by previously escribed methods utilizing the diffracted x-ray beam.

An x-ray spectrometer may be utilized both for entifying metal coatings on steel and for measuring heir thickness. For the former use, a target material selected to give a minimum of secondary radiation om the coating and base metal and the Bragg equa- on used for calculating interplanar spacings. For pplication to thickness measurements, an x-ray arget is selected and voltages used which will pro- uce a maximum background from the base metal ithout exciting significant secondary radiation from ne coating. In the work carried out by Beeghly, urves made on steel with copper K radiation were sed because of the greater intensity of the back- round with copper radiation as compared with iron adiation.

The fluorescent radiation from the iron sample roduced by the copper K radiation is absorbed in assing through tin and other coatings in much the ame way that light is absorbed in a solution. The nsertion of a tin coating between the base metal nd pickup element should then result in a loss in ackground intensity and should be in proportion to ne thickness of the tin. The intensity of the primary eam striking the base metal is also decreased with ncreasing thickness of coating, and this will increase ne rate at which background intensity falls off with ncrease in coating weight.

Fig. 2 gives values obtained on representative amples of tin plate which shows a variation in in- ensity related to coating weight. In these tests, opper K radiation was used with a scanning rate of rpm (2° per min.). Intensity values at selected angles are plotted against corresponding coating weights.

It was pointed out by Beeghly that correlation of coating weights with intensity was done in a manner somewhat analogous to that used in preparing a calibration curve in absorption spectroscopy. The tin coating corresponds to the absorbing solution, secondary radiation from the steel base to the light, and angle at which the intensity measurement is taken to wave-length most strongly absorbed. It was pointed out that the actual angle selected is not critical, provided it is not one at which a diffraction peak occurs. Once the necessary conditions for measuring coating weights are established, there is no need for obtaining the complete x-ray curve of the specimen.

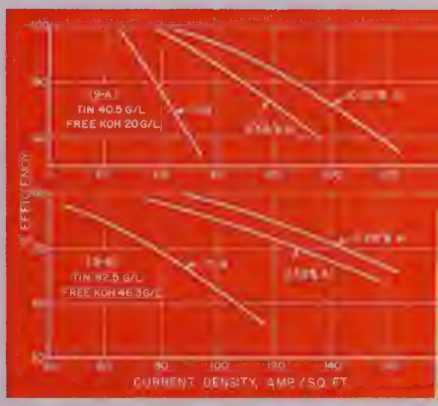


Fig. 3—Effect of aluminum on anode efficiency of tin in potassium stannate solutions at 90° C

Intensity Plotted — Beeghly pointed out that in preparing curves for practical commercial use it is convenient to plot the intensity of the diffracted beam (instrument reading) directly against the logarithm of the coating weights. Work carried out on correlation of coating weights with manually recorded and automatically recorded values indicated that either method is capable of a satisfactory degree of accuracy.

Coating weights are measured by placing a specimen in the holder and registering counts over the time interval necessary to give not less than 6000

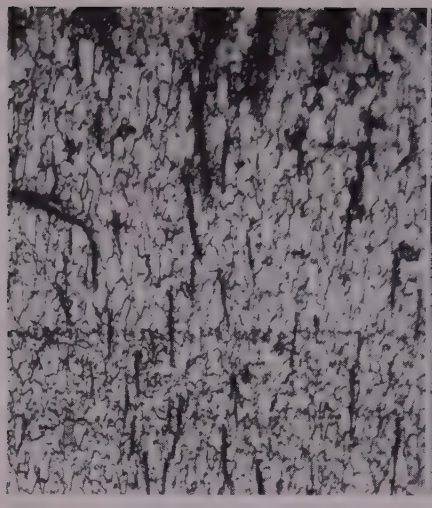


Fig. 4 (far left)—Microstructure of a cross-section of hard chromium plate in "as-plated" condition. The inclusion-filled cracks normally found in hard chromium plate are clearly shown

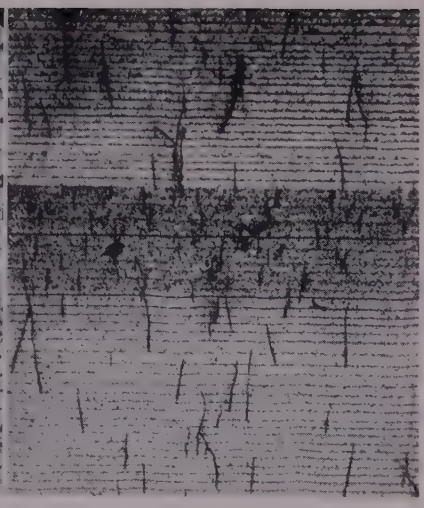


Fig. 5 (left)—Microstructure of hard chromium plate after treatment at 700° C (1292° F) for 12 hours in Battelle experiments. Complete recrystallization of the plate occurred during this treatment

counts at the angle and slit settings for which a calibration curve such as this has been established and at a rate that does not exceed resolving or registering ability of the recording circuit. The intensity (counts per standard time interval) is converted to coating weight by means of the curve.

The x-ray method is useful for the routine measurement of coating weights on each surface and for determination of the variation in coating weight from edge to center of sheets. Some differences that may be obtained on opposite sides of test coupons are shown in Table I. These values were obtained under conditions which gave excellent reproducibility of readings. In addition to routine control, the method has been helpful in explaining some of the variations in performance of articles fabricated from coated steel. The method is not limited to tin on steel but appears to be generally useful for metal coatings such as lead, silver or cadmium where the base metal can be made to fluoresce by an x-ray beam which does not produce fluorescence from the coating.

Anode for Alkaline Tin Plating—In another paper on the general subject of tin plating at the electrodeposition symposium, F. A. Lowenheim, Metal and Thermit Corp., New York, presented data to show

TABLE I

COMPARISON OF COATING WEIGHTS OBTAINED BY STANDARD METHOD WITH THOSE OBTAINED WITH X-RAY METHOD

Sample	Type	Side	Coating Weight—Lbs./Base Box Std. Method	X-Ray Method
1	ELECTROLYTIC	A		.49
		B		.54
		AVE.	.52	.52
2	ELECTROLYTIC	A		.41
		B		.395
		AVE.	.42	.40
3	ELECTROLYTIC	A		.54
		B		.51
		AVE.	.52	.525
4	ELECTROLYTIC	A		.50
		B		.47
		AVE.	.50	.485
5	ELECTROLYTIC	A		.73
		B		.70
		AVE.	.70	.715
6	ELECTROLYTIC	A		.81
		B		.83
		AVE.	.83	.82
7	HOT DIP	A		1.21
		B		1.08
		AVE.	1.03	1.145
8	HOT DIP	A		1.55
		B		1.31
		AVE.	1.25	1.43

that by the incorporation of up to about 1 per ce aluminum in tin anodes used in alkaline tin platir the current densities obtainable can be markedly i creased. In the course of the laboratory work report the effect of 26 elements upon the anode behavior tin in alkaline solutions was studied. Many were r ported to have little effect in the quantities teste which was up to about 1 per cent; some, such nickel, silver, cadmium, and indium were found have a strong passivating action. Among the sever which indicated an improvement in anode efficienc aluminum appeared to be the most promising fro a practical standpoint.

The investigation conducted by Lowenheim plac principal emphasis upon the potassium stannate ty bath; however, enough work was done with t sodium stannate solution to show that the benefi of the aluminum alloy are common to both. It w pointed out that the potassium stannate type ba permits the use of higher cathode current densiti than are allowed by the sodium stannate bath, b the practical utilization of these higher current de sities are subject to certain limitations; either t anode current density has to be kept low or solutio relatively high in free potassium hydroxide must b used.

First alternative requires that the ratio of anod area to cathode area be greater than 1, the highe the better. This condition may not always be fu filled because of the geometry of plating installation Because the tin or stannate content must likewise b raised to compensate for the deleterious effect o the cathode efficiency of increased free alkali, th second alternative leads to rather concentrated solu tions. It was predicted by Lowenheim that improve

TABLE II

SURFACE ROUGHNESS MEASUREMENTS USING GAS ABSORPTION METHOD

Surface	Roughness Fact
Aluminum as rolled	1.5
Auminum etched by sodium carbonate solution	10.
Aluminum etched by chromic-sulphuric acid solution	80.
Aluminum anodized 42 minutes in 10% CrO_3 solution at 40 V. and 40° C.	80.
Aluminum anodized 15 minutes in 15% H_2SO_4 at 15 ma/cm² and 21° C.	225.
Freshly blown glass	1.0

ient in anodic efficiency ought, therefore, to widen ubstantially the field of usefulness of the potassium annate solution in tin plating applications.

Lowenheim pointed out that, whereas the aluinum-tin alloys, in the initial tests appeared better an any other in regard to anode efficiency, that not the only reason for recommending their use mmercially. Some of the other alloying elements, iosphorus, arsenic, bismuth, and gallium, appeared most as good. But aluminum combines with this iode performance the advantageous qualities of ntoxicity, economy, ease of alloying, favorable meanical properties of the resulting alloy, and a posiin in the electromotive series which assures that definitely will not codeposit with the tin at the thode.

Tests showed that as little as 0.1 per cent aluinum improved the anode performance slightly, t that to gain the greatest effect, about 1 per cent uminum should be used. Further increase in aluinum content confers no additional benefit. Fig. 3 ows graphically the effect of aluminum on anode iciency of tin in two types of potassium stannate ths. From the practical angle, the aluminum-tin ode may prove useful in enlarging the range of ility of the potassium stannate bath, by bringing e permissible current density of the anode more arly into line with the higher cathode current denies for this bath.

Structure of Hard Chromium Plate—C. A. Snavely and Charles L. Faust reported on work conducted Battelle Memorial Institute to determine the structral changes that take place during the annealing chromium plate. It was pointed out that two genal concepts for the hardness of chromium plate ve been proposed. One accounts for it by the fineained condition of the plate, with internal stress ing a minor contributing factor. Loss of hardness heating is considered to result from recrystallizan and grain growth. The other accounts for hardss by a critical dispersion of chromic oxide particles uich are said to exert a "keying" action to inhibit p within crystals in a manner analogous to that stulated for various precipitation hardening alloys. cs of hardness on heating is ascribed to agglomeran of the dispersed oxide particles with subsequent gration into the grain boundaries.

It was brought out by Snavely and Faust that if tening is the result of recrystallization, then the ginning of major softening effects during annealing ould be accompanied by the appearance of recrystallized grains in the metal. If softening is a ult of agglomeration of oxides, these agglomerates ould be visible under a microscope. Using this reasoning as a basis, a series of experiments were conducted in the Battelle laboratories which involved plating hard chromium on steel cathode disks, annealing them at different temperatures, and subjecting all of the disks to complete metallographic examination.

Fig. 4 shows the microstructure of a cross section of hard chromium plate in the "as plated" condition. The inclusion-filled cracks that are normally found in the hard chromium plates are plainly illustrated here.

It was pointed out by the experimenters that heat treatment at 300° C (572° F) for 22 hours produced no significant change from the original structure. In specimens that were heat treated at 500° C (932° F), recrystallized grains were definitely revealed, establishing the fact that recrystallization of hard chromium plate takes place between 300° C (572°F) and 500° C (932° F).

Experimental data were presented to show that complete recrystallization of the chromium plate took place during an annealing treatment at 700° C (1292° F) for 12 hours as illustrated by the photomicrograph in Fig. 5. Essentially no structural changes were effected by increasing the annealing temperature to 900° C (1652° F). However, it was pointed out that interdiffusion during the 900° C (1652° F) treatment produced an alloy layer between the steel base metal and the chromium plate. Only a slight loss of hardness was evidenced at the lower annealing temperature which (*Please turn to Page* 117)

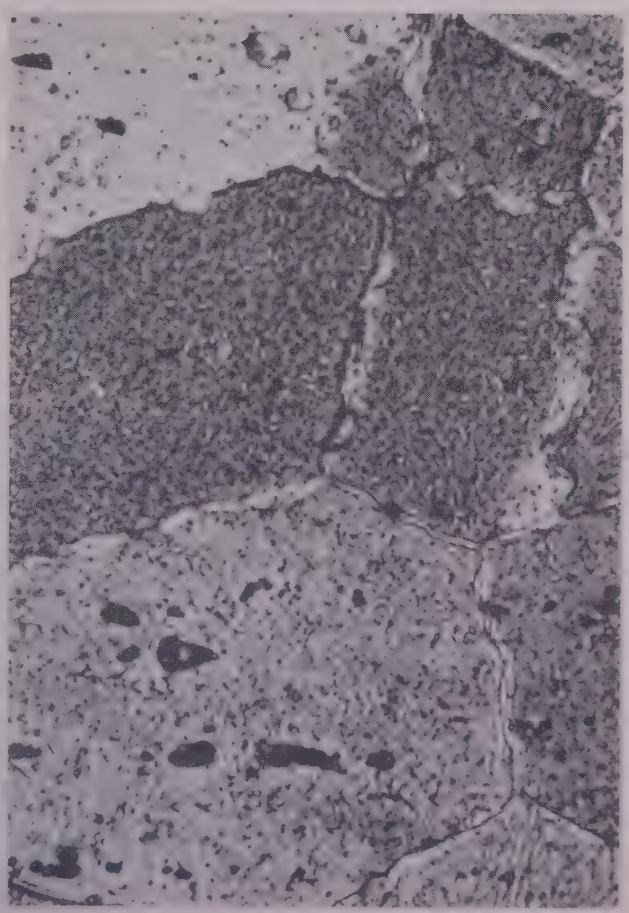


Fig. 6—Grain structure of wrought copper-aluminum alloy in which microsolution potential measurements were applied to study corrosion characteristics. Alloy contains 4.5 per cent copper; air cooled from 910° F. Shown is appearance after 6 hours' exposure to standard intergranular salt and peroxide corrosion solution. Attack is along the depleted grain boundaries. Original 4x5 photo was 100X

MANY Americans concerned with alloy steels have vaguely heard of temper brittleness and forgotten about it, feeling that temper brittleness is a disease that occasionally appears in steels made in Europe, especially steels for military use, but that American-made steels are immune. This unfortunately is not so. Temper brittleness occurs in American steels as well as in European, in "civilian" steels as well as in "military". Most of the SAE alloy steels are significantly susceptible. Moreover, it seems likely that temper brittleness develops in plain carbon steels as well as in alloy steels.

Effect of temper brittleness upon behavior of steel is illustrated by Fig. 1. The steel used, before embrittlement, was tough under the conditions of the Charpy impact test at room temperature and even lower. When temper brittle, the steel was not fully tough below 375° F (190° C). Temper brittleness lowered the Charpy impact energy at room temperature from 95 ft-lb to 20. Correspondingly, many parts that would perform satisfactorily in service when made of the nontemper-brittle material are likely to break if made of the temper brittle steel.

Only significant effect of temper brittleness is to raise the temperature of transition from tough to brittle behavior, Fig. 1, and accordingly to increase the likelihood of brittle behavior at any fixed temperature. This is particularly important in parts subject to shock or rapid loading, or intended for service at low temperatures, but other parts too may fail brittlely. Ship hulls are the most famous example of such parts, though the hull failures were not primarily due to temper brittleness.

Left to right—
Fig. 1—Effect of temper brittleness on toughness of SAE 3130 steel. V-notch Charpy impact test. Legend: Q—Not embrittled; U—severely embrittled. After Hollomon, Jaffe, McCarthy & Norton, reference 1

Fig. 2—Time-temperature diagram for embrittlement of SAE 3140. Reference 2

Fig. 3—Photomicrographs with picric acid-ether-Zephiran etching reagent. X2000. Left—embrittled, right—not embrittled. Reference 5

WHAT T

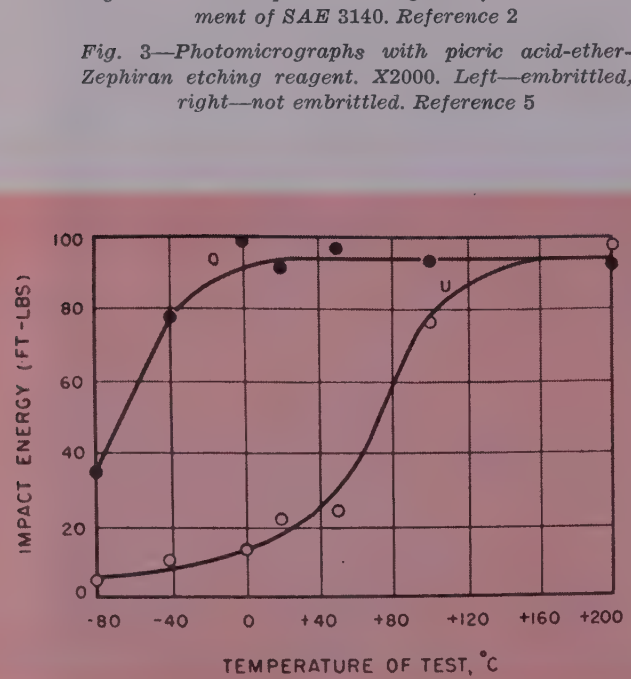
Temp

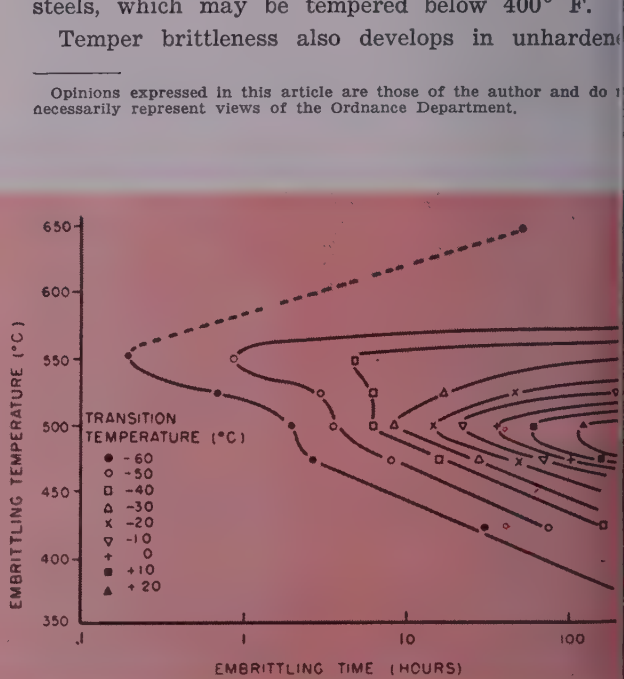
The phenomenon of temper brittleness is much more prevalent in steels than was previously supposed. Recent research into methods of reducing this condition are reported here

Heat Treatments—Development of temper brittl ness is most obvious in quenched and tempered stee If a susceptible steel is furnace-cooled from a te pering temperature above 1100° F, it will have higher temperature of transition from tough to brit behavior than if quenched from the tempering te perature, as shown in Fig. 1. Also, if, after quenc ing from a high tempering temperature, the m terial is reheated below this temperature but abo 650° F, as in stress-relieving after welding, it w become more brittle (its transition temperature w rise). Steels likewise gradually become brittle d ing the tempering treatment itself. This is not a ways obvious, because the temper embrittlement offset by increase in toughness resulting from softe ing which accompanies the tempering. Since it ordinarily inadvisable to temper steels between 40 and 700° F because of the poor toughness found this range, temper brittleness is a factor in quenched and tempered steels, except perhaps to steels, which may be tempered below 400° F.

Temper brittleness also develops in unharden

Opinions expressed in this article are those of the author and do necessarily represent views of the Ordnance Department.





T O A B O U T

rittleness of Steels

By LEONARD D. JAFFE
Chief, Physical Metallurgy Branch
Watertown Arsenal Laboratory
Watertown, Mass.

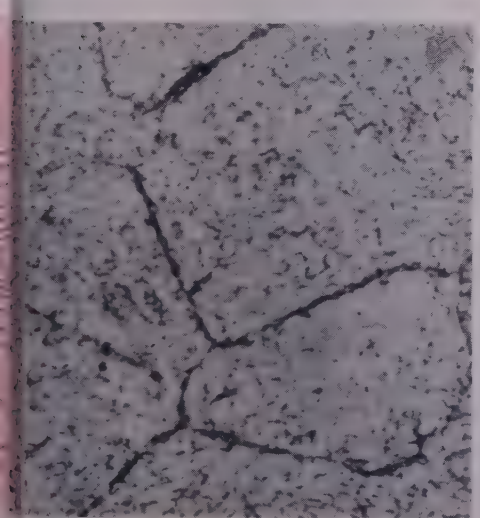
els. If such steels are reheated between 650° F d the critical range, they become more brittle. heir transition temperature is raised.) In general, e increase is not so much as for the same steels i the hardened and tempered condition.[2] However, en neither the unhardened nor the quenched and npered material is reheated, the unhardened steels e more brittle (have higher transition tempera- res) than quenched and tempered steels of the ne hardness. It is possible that one of the reasons r the greater brittleness of the unhardened steels that the ferrite, pearlite, or bainite which formed the last cooling from the austenite range devel- ed temper brittleness before it cooled down below 0° F. Martensite of the hardened steels formed ow 650° F and so had no chance to temper-em- ttle unless reheated. On this basis, unhardened els show less development of temper brittleness reheating because they are already temper brittle d can develop only a limited amount of additional nper brittleness.

Development Slower—The lower limit of 650° F ntioned for the development of temper brittleness es not represent any marked change. It is simply t development of temper brittleness becomes slow- and slower as the temperature is lowered. Below out 650° F temper brittleness develops so slowly t it is unlikely to be of practical importance. is is illustrated by Fig. 2, which shows the amount temper brittleness, in terms of the transition nperature in V-notch Charpy test, resulting from lding a quenched and tempered steel isothermally various times at various temperatures.

A C-curve is obtained somewhat resembling those for isothermal decomposition of austenite. Embrittlement occurs most rapidly near 1020° F (550° C). At both higher and lower temperatures embrittlement is slower. Fig. 2 does not give much idea of the embrittlement above 1100° F (600° C). Recent work[2,3] shows, however, that contrary to earlier views, embrittlement takes place above 1100° F and indeed at all temperatures below the lower critical. Close to the critical, embrittlement is much slower than near 1000° F.

When severely embrittled steel is reheated between 900° F and the critical temperature, the embrittlement is reduced, as measured after subsequent quenching. As the reheating temperature increases, the decrease in embrittlement becomes more rapid and more complete. For any fixed temperature of holding, below the tempering temperature, the same degree of embrittlement is approached by samples previously severely embrittled as by specimens previously unembrittled.[4] This equilibrium degree of embrittlement is less the higher the reheating temperature. Reheating treatments long and high enough to soften the steel naturally tend to increase its toughness.

Metallographic Effects—For many years no change in microstructure could be found to be associated with temper brittleness. Within the last few years certain etching reagents, most of which contain wetting agents, have been found to attack austenite grain boundaries more rapidly in temper brittle specimens than in nonbrittle specimens of the same steel,[5-7] Fig. 3. These reagents apparently provide metallographic evidence of temper brittleness.



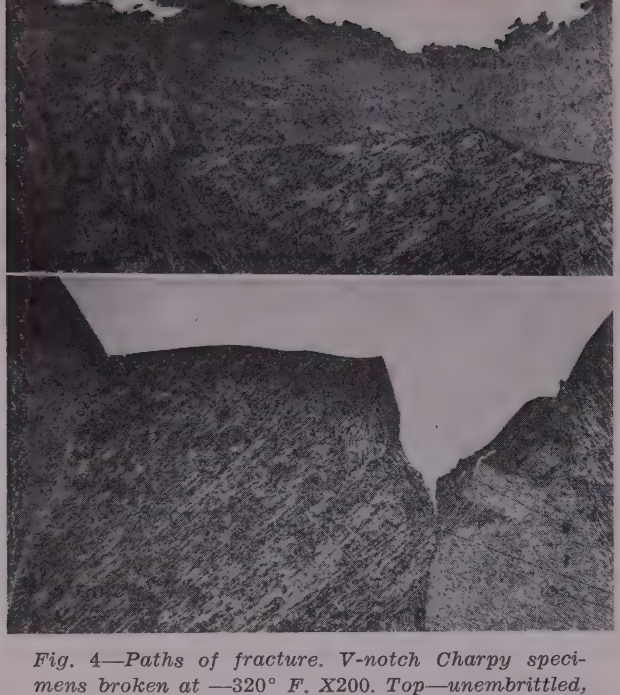


Fig. 4—Paths of fracture. V-notch Charpy specimens broken at —320° F. X200. Top—unembrittled, bottom—embrittled. Courtesy Mary Norton

It is not yet possible, however, to determine by metallographic methods whether a steel is temper-brittle, unless there are available comparison specimens of the same heat that are known not to be brittle. No particles peculiar to temper brittleness have been identified or even seen. The metallographic results are of further interest, nevertheless, in supporting earlier views that temper brittleness is associated with grain boundaries. It is especially interesting that these are primarily austenite grain boundaries, inasmuch as the material is not austenitic when the temper brittleness develops.

Additional evidence that temper brittleness is a grain-boundary phenomenon is given by examination of fractured specimens.[6] Fracture of steel broken below the transition temperature range appears "crystalline" or "granular" to the unaided eye, whether or not the material is temper brittle. When specimens are sectioned and examined under the microscope, however, it is found that temper brittle steel fractures mostly at grain boundaries, whereas unembrittled steel breaks almost entirely through the grains, as shown in Fig. 4.

Influence of Composition—Until recently it was believed that temper brittleness occurred only in alloy steels, and that the alloys were in some way responsible. This belief was based on the evidence that there was little if any difference in toughness, at any test temperature, between specimens of plain carbon steels given a treatment to bring out temper brittleness and those simply quenched from the draw, Fig. 5. Thus, the embrittling treatment produced no loss in toughness. It now seems doubtful that this evidence was properly interpreted.[9]

In the first place, since it is difficult to harden plain carbon steels throughout the section of a Charpy bar, all the tests had been made on unhardened material, where less shift in transition temperature occurs. New tests on SAE 1045, using subsize Charpy bars that could be completely hardened, have revealed some shift in transition temperature. In t second place, even if there were no difference tween the transition curves, this might simply m that the specimens quenched from the draw w as badly embrittled as those given the embrittl treatment. Indeed, it appears that transition te perature of plain carbon steel, whether given an tentional embrittling treatment or not, is about t same as that for embrittled alloy steel of the sa microstructure, grain size, etc.

This supports the belief that the carbon steel embrittled with either heat treatment. Moreov the path of fracture in plain carbon steel is like th in embrittled alloy steel and is different from th of unembrittled alloy steel.[10] The generally accep low toughness of plain carbon steels, as compar to alloy steels, may thus be partially due to the c bon steels being almost always temper brittle. loying elements appear to slow down the develo ment of temper brittleness so that it can be avoid by suitable heat treatment. It has long been kno that molybdenum does this.

Susceptibility Increases — When transition cur for samples quenched from the temper are compar with those for samples given a moderate embrittli treatment, it is found that the susceptibility to te per brittleness, as measured by the temperature d ference between these curves, increases with increasi content of manganese (Fig. 6), chromium, nickel, vanadium.[11-14] This increase in degree of embritt ment caused by alloys is to be distinguished from t retardation in rate of embrittlement. Nickel increas the degree of embrittlement less than an equal p centage of chromium or manganese.

For moderate embrittling treatments, as encou tered in heat treatment, the brittleness (increase transition temperature) is reduced by additions molybdenum up to about 0.60 per cent.[11-13, 15] This a reflection of the strong effect of molybdenum retarding development of temper brittleness. For lo embrittling treatments, as may be encountered parts used at elevated temperatures, temper embritt ment is not reduced by the addition of molybdenum

Increase of molybdenum content above 0.60 p cent increases the tendency to temper brittlene Thus, steels containing 0.10 per cent carbon and 2 p cent molybdenum may become severely embrittl during normal heat treatment operations.[16]

Phosphorus Increases Tendency—Increase in pho phorus content increases very markedly the tenden toward temper brittleness, as shown in Fig. 7. 0.0 per cent phosphorus has as strong an effect as se eral percent of nickel, chromium, or manganese. Su phur, on the other hand, has no effect on temp brittleness. 0.08 per cent antimony produces extrem temper brittleness, but even this small percenta is considerably higher than the amount of antimo normally found in steel.[12, 14]

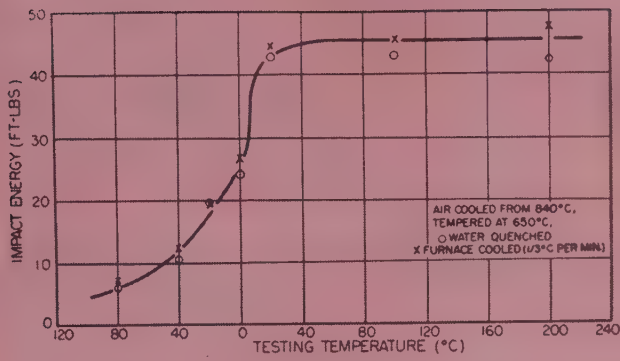
Removing the carbon and nitrogen from steel (below 0.01 per cent C and 0.0005 per cent N) preven temper brittleness, as indicated by an absence change in transition temperature when a modera embrittling treatment is applied.[13, 17] Unfortunatel even if "steels" could be made without carbon, th would not be of much use!

Cause and Cure—Cause of temper brittleness is not known. The most widely accepted idea is that it is due to precipitation of iron carbide or iron nitride at grain boundaries.[3, 8] Another theory attributes temper brittleness to segregation of dissolved carbon along grain boundaries.[6] There are various objections to these and other theories,[18] and the true cause will be established only by further research.

No magic drug to cure or prevent temper brittleness is known, either. Certain measures may be taken, however, to reduce temper brittleness so that in most cases it need not be of practical importance. First, if material tempered above 1000° F, cool rapidly from the draw. Air cooling is better than furnace-cooling, and quenching is better yet. Second, keep the tempering time short. Use a short draw at a high temperature rather than a long draw at a lower temperature. (But don't go over the critical! Ac_1 temperatures are often much lower than the handbooks indicate, and brittleness will result if they are exceeded.) The old rule of "an hour per inch of thickness" should be disregarded. To maintain good control with short tempering times, the heating time must be short too. Accordingly, tempering in salt baths, by induction, or by rapid gas heating is likely to be advantageous.

Third, use a tough microstructure to start with. If the unembrittled material is sufficiently tough (its transition temperature sufficiently low), the rise in toughness (increase in transition temperature) resulting from temper brittleness may not be enough to cause service failures. A microstructure of tempered bainite is tougher than one of pearlite, at the same hardness, and tempered martensite is in turn tougher than bainite[1]. Accordingly, in general, come as close as possible to quenching out (fully hardening) the material, then temper it. Do not use unnecessarily high hardness or carbon content, as these tend to lower toughness. Keep the grain size in the part fine.

Keep Alloy Down—Fourth, don't use too much alloy. Keep the content of manganese, chromium, nickel and vanadium as low as hardenability requirements will permit. (A low alloy steel is preferable to a plain carbon steel, however.) With heavy sections it is doubly difficult to avoid temper brittleness, because high alloy contents are needed for hardenability, and short tempering times with rapid cooling thereafter are not readily attained. Even if the outside of a heavy part is quenched rapidly from the draw, the inside will cool rather slowly. In sections over 6 inches thick temper brittleness is often so serious that it proves worthwhile to sacrifice some hardenability to permit (*Continued on Page* 114)


IMPACT ENERGY (FT-LBS)
TESTING TEMPERATURE (°C)
AIR COOLED FROM 840°C, TEMPERED AT 650°C,
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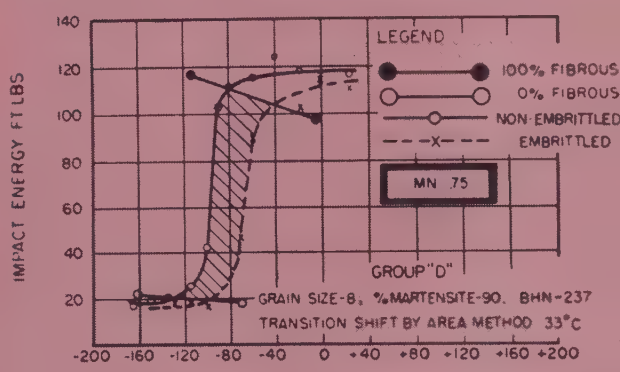
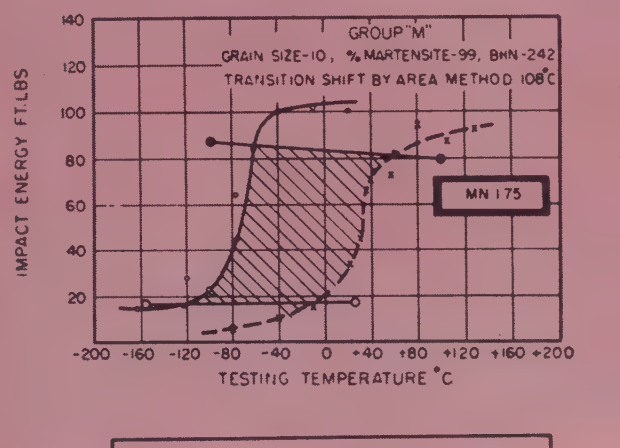
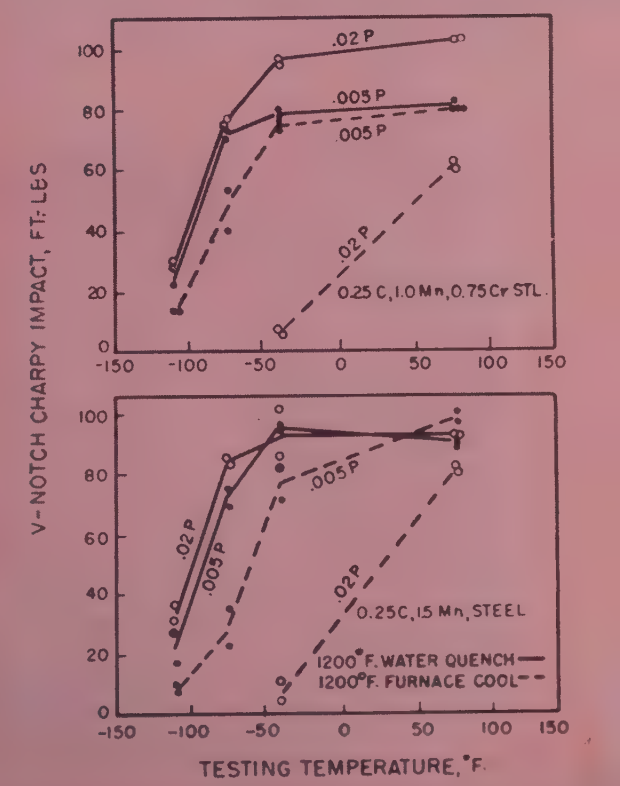






Top to bottom—

Fig. 5—Temper brittleness tests on SAE 1035 steel. Reference 8

Fig. 6—Effect of manganese on amount of temper brittleness. Base composition 0.30 per cent C, 0.25 Si, 1.50 Ni. Reference 11

Fig. 7—Effect of phosphorus on amount of temper brittleness. Steels quenched from 1625° F and tempered as indicated. Reference 14

NEW SOAKING PIT INSTALLATION

. . . controls ingot temperatures within plus or minus 10°F

This installation is noteworthy in that dry mill scale is used for the bottom instead of coke and affords the operators an extra long bottom life of from 9 to 10 months

By DAN REEBEL
Associate Editor, STEEL

THOROUGH ingot heating to predetermined temperatures within plus or minus 10° F is being realized by Allegheny Ludlum Steel Corp., Brackenridge, Pa., with their newly installed battery of eight tangentially fired circular soaking pits designed and built by Salem Engineering Co., Salem, O. This is believed to be the first installation which guarantees absolutely accurate readings of ingot temperatures within the pit.

Control principle utilized is that when hearth temperature as indicated by the rayotube in the cover matches temperature of the rayotube in the side wall the pit is then considered ready for drawing, the ingots being uniform in temperature from top to bottom and side to side. The theory involved is that when these two rayotubes are in line, anything between the two points must be the same as the temperature indicated. This control system revolves around the meeting of the following conditions: Utilization of luminous flame burners, good combustion control to maintain the proper furnace atmosphere and proper flame characteristics throughout t turndown range, good maintenance of the temperatu control equipment, and proper spacing of the ing within the soaking pit.

Pits are staggered in two rows of four each a measure 13 feet in diameter and 7 feet from top the bottom to parting line of the pit. Each fu nace is capable of handling 60-65 tons of ingots p load. The luminous flame burners may be fir by either natural gas or fuel oil.

Remote Control Operation—There are provided t stacks, 5 feet 6 inches in diameter by 100 feet height, each of which exhausts four pits. One doul span cover handling mechanism built by Allian Machine Co., Alliance, O., services the pits. Th is equipped for remote control operation from eith of two control stations. The stiff leg overhead char ing crane was built by Morgan Engineering C Alliance, O.

A separate control house whose atmosphere is f tered and pressurized contains all instrumentati and control facilities. The control for the eight soa ing pits includes automatic Leeds & Northrup te perature control, Askania fuel air ratio control, A kania pressure control and Ring Balance dual a and gas meters. The meters record and integra the gas flow and record the air flow. All eight p are equipped with Leeds & Northrup temperatu control. Six are equipped with Askania fuel air r tio control and Askania pressure control, the oth two being equipped with Leeds & Northrup fuel a ratio control and pressure control.

This installation is noteworthy in that dry m scale is used for the bottom instead of coke. In a dition to showing no signs of fusion, this mater also affords an extra long bottom life of at lea 9 to 10 months, no decarburization, corrosion or er sion of the butt of the ingot and less maintenan on the pit bottom.

Carbon, alloy, and silicon grade ingots are heat from cold up to 2450° F in approximately 8½ hou before being given their first pass in the new 40-in Morgan blooming mill which the pits service.

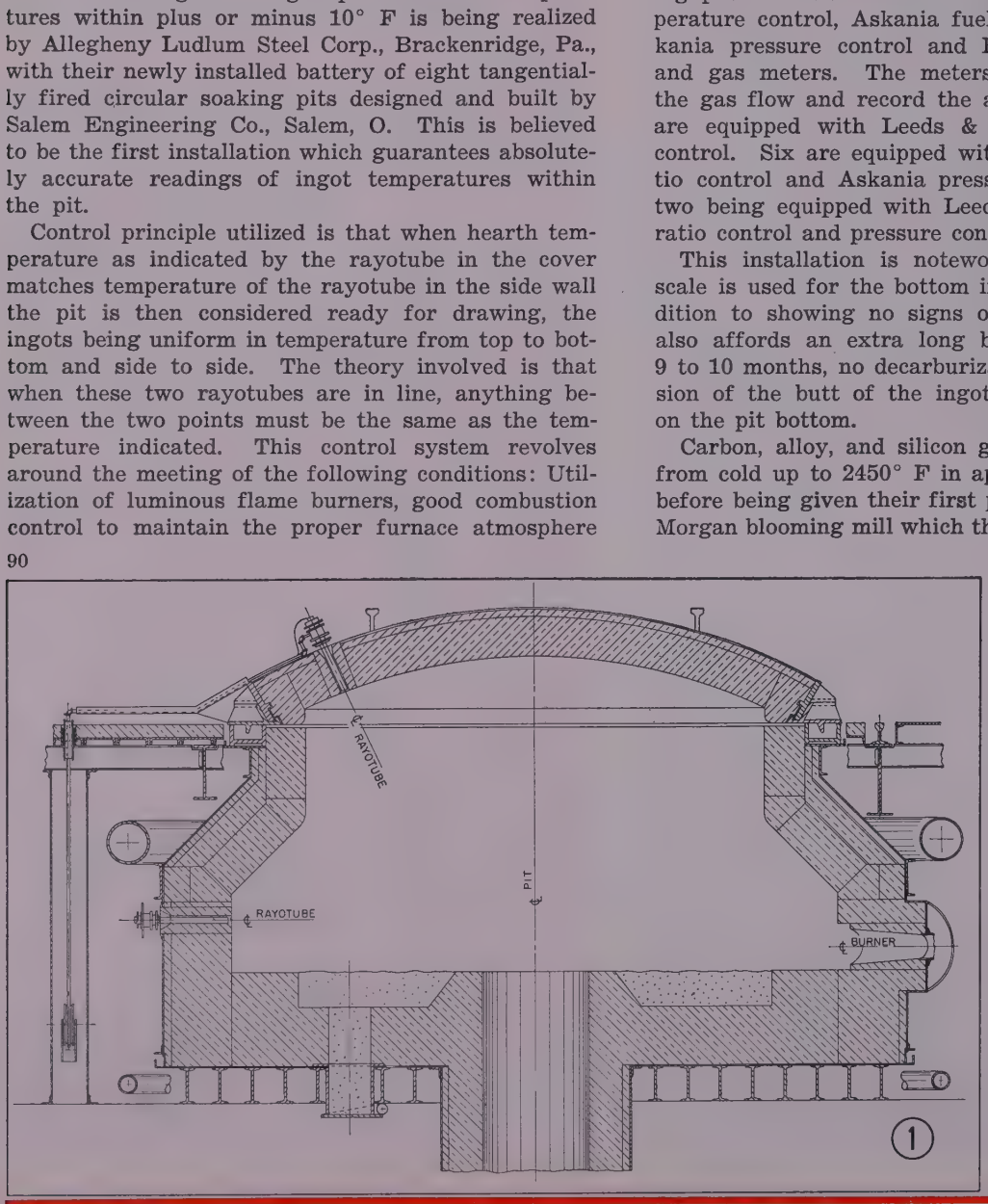


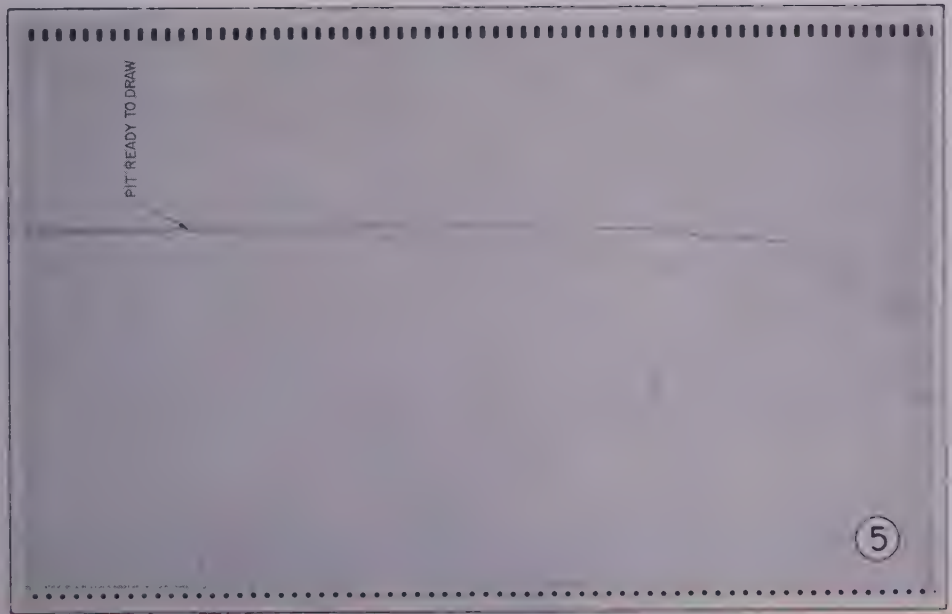
Fig. 1—Elevation o of the circular so pits showing positi the burners, general line of the pit and lo of rayotube in both wall and cover

Fig. 2—Drawing an from one of the p

Fig. 3—General arr ment of the eight p a staggered layo

4—*Close-up of the tube in the furnace and method of han- the air hose and oire when cover is in motion*

5—*Chart taken from Leeds & Northrup erature control in- nent showing the two coming together a charge of ingots ing heated. The solid is made by the rayo- in the sidewall and roken line by the ray- tube in the cover*



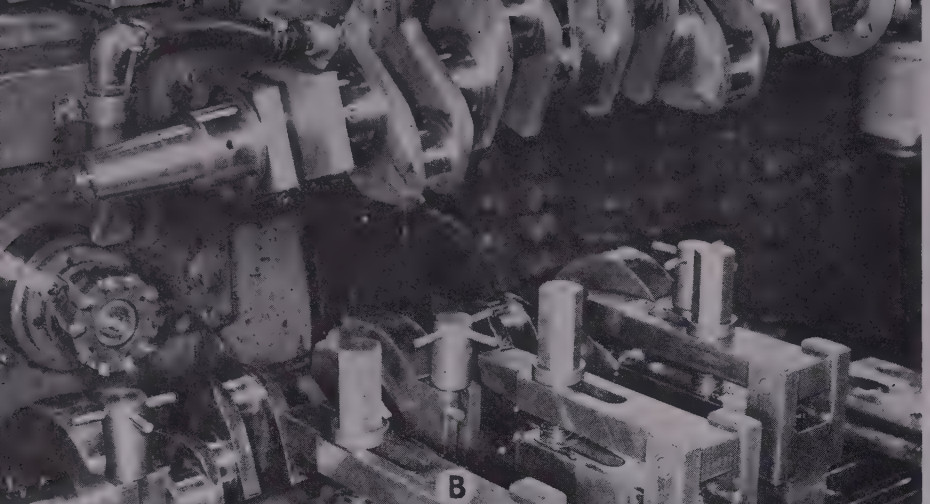


Fig. 1—Milling counterweight attaching pads. Key to equipment is explained in the text

Special Fixtures Save Time

In machining Hercules crankshafts

By ROBERT MAWSON

SPECIAL tools used for machining automobile motor details should locate the workpiece, and the piece should be held securely. These conditions are necessary so that interchangeable results can be obtained on the machined product. Further, if these tools can be designed and built so that several sizes or types may be machined in the jig or fixture, by effecting quick changes, the equipment may well be considered high grade tool designing.

Hercules Motors Corp., Canton, O. incorporates these several important features in the special tools used in their plant. Two of these are described in this article. In Fig. 1 the special tool and method employed to mill the counterweight attaching pads on the crankshafts are shown.

The fixture is made with a boiler plate base on which are located, with steel keys and fastened with socket head screws, three machine steel workpiece supports (A). These supports are provided with a machine steel swinging cap, which rotates on a steel pin for each assembly. They are held in the machining position with a threaded bolt which may be moved up or down by means of a nut fitted with four steel pins.

Workpiece Locators — Three machine steel workpiece locators (B), for positioning the piece, are provided with the fixture. Each locator is machined with a tongue which fits a groove in the base of the detail which in turn is attached to the main base of the fixture. With this construction, the locator can be moved in out to suit the different sizes crankshafts milled in the fixtu Arm of the locator rotates on a st pin and is moved to contact the wor piece with a screw machined with long hexagon head.

This fixture is used to machine fo various sizes of crankshafts. To me this condition liners are provided t the bearings in the supports (A Also, several holes are drilled a tapped in the main base so the su ports and locators can be moved positions to suit the respective cran shafts. The portion (C) of the cators can also be moved either or out to suit the workpiece bei milled. The operation is perform on a Sundstrand Rigidmill to t spindle of which has been added hydraulically-operated vertical feed

Using the Fixture—Main base located with steel keys and held place with bolts on the machine tab The high speed inserted tooth milli cutter is fastened in the machi spindle in the conventional mann The three supports, with their co rect liners, and the locators ha been positioned on the main base suit the crankcase to be milled.

One of the workpieces is then loa ed into the fixture with the No. throw under the milling cutter, th position being determined with th proper locator. When No. 1 thro has been machined the workpiece indexed to No. 6 throw, the positio being again determined with its l cator. When No. 6 throw is com pleted, the shaft is indexed in the fi ture to position No. 5 and No. throws, which are milled. The sha

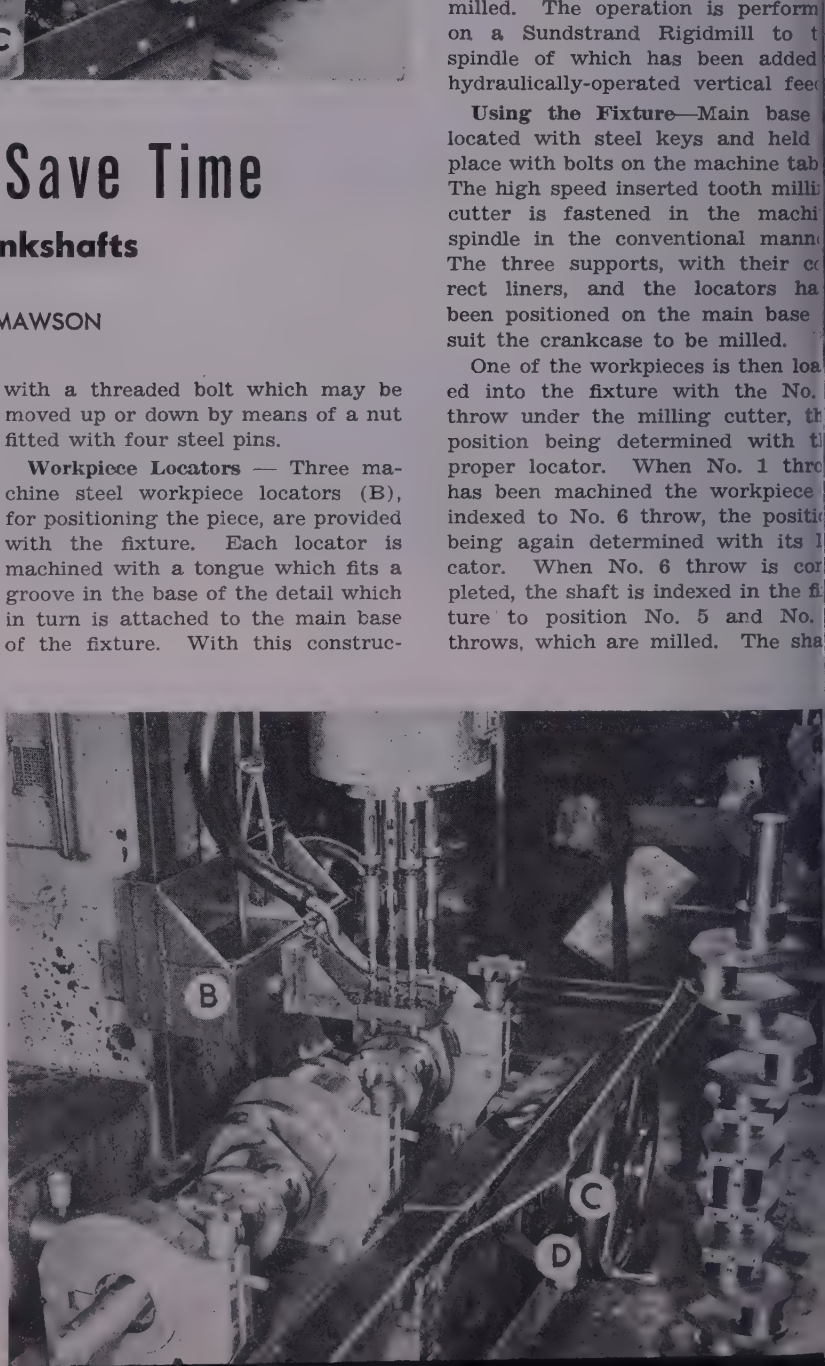


Fig. 2—Drilling counterweight attaching holes. Key is explained in text

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is again indexed to the proper position for No. 3 and No. 4 throws, and these are machined. The milling operations on all the throws have now been completed. The crankshaft has been accurately located and held securely during the operations and can be quickly removed by screwing back the pin operated nuts on the support caps which can be rotated out of contact with the journals of the workpiece.

Drilling Holes in Crankshaft—An interesting special jig fixture is used when drilling the counterweight attaching holes in the crankshafts. This is illustrated in Fig. 2. Base of this fixture is made of machine steel which is attached to the table of a heavy duty Baker drill equipped with a six-spindle drill head. On the base is fastened three machine steel workpiece supports (A). These details are provided with a machine steel cover which can rotate on a steel pin and held in the machining position with a knob type operated swinging bolt.

This fixture is also used to machine four sizes of crankshafts. To meet this requirement liners are provided for the supports and holes are drilled and then tapped in the base in the correct positions. The welded construction guide bushing head (B) can be moved up or down by means of a rack and pinion operated with the hand wheel which may be seen at the rear of the head.

The fixture is moved longitudinally with a rack and pinion which is operated with the hand wheel (C). In the base six hardened tool steel bushings are accurately located. A tool steel pin moved with the handle (D) enters the bushings and gives the proper machining positions.

Drilling Operations — To perform the drilling operation the fixtur first correctly located and faste on the drill press table. One of crankshafts is then placed in the s ports which have been fitted with correct liners. The fixture is moved longitudinally with the h dle (C), until the locating pin, mo with the lever (D), has brought 1 and No. 6 throws into the pro position. The head (B) is then l ered with the rack and pinion u the bushing plate contacts No throw. The plate contacting surface of the throw rotates it correct alignment. Caps on the th supports are now tightened to l the crankshaft securely in positi

Six holes are now drilled in throw, three on each side flange. drills are then removed from t collets and substituted with a tap the four outer holes. A drill is fastened in the proper spindle to chine a hole in the journal. The h (B) is now fed down and the chining operation completed or throw.

After drilling the No. 1 throw fixture is moved and indexed to N for the second operation and the chining operation repeated. Then crankshaft is indexed to bring N and No. 5 throws to the spindles. ter these are completed, the wo piece is indexed for drilling No. 3 No. 5 throws which are machined described.

From a study of these two mac ing fixtures it will be seen t though they may be considered m production equipment with accu locating and positive holding tures, provision has been made so t similar workpieces with slight va tion can also be machined efficien The tools and methods described therefore be well considered h grade tool designing and process engineering.

HOIST HANDLING: Over 625 feet of main line and spurs comprise this heavy-duty monorail hoist system recently installed in the receiving division of Burroughs Adding Machine Co.'s main plant, Detroit. Three 4-ton capacity hoists lift steel bundles off trucks in the receiving dock, move them to a weighing section on the track, deliver them to storage bins and later transfer them either to inspection or to square shears for cutting to specification

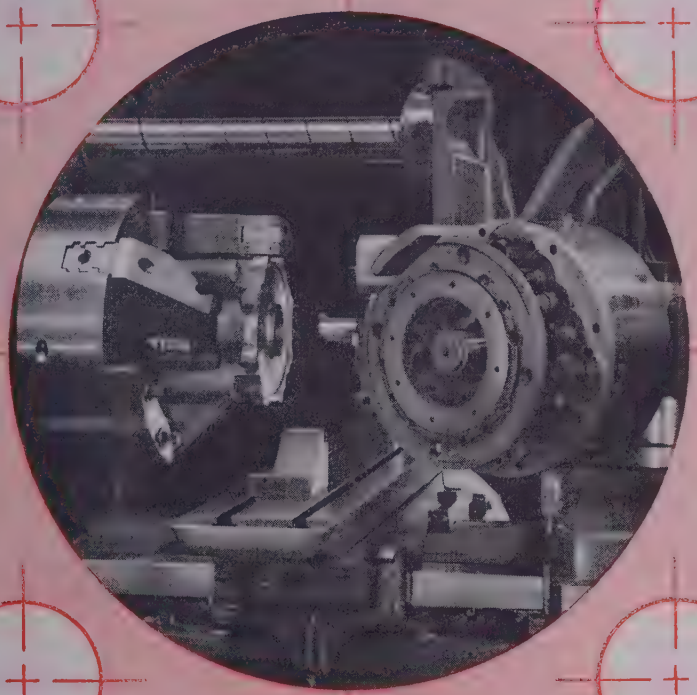
Car Doors Open Longitudinall

FEATURE of 200 new hopper c being placed in service with Ca dian Pacific Railway is the longiti nal opening of the hopper doors. charging to the center and sides multaneously or singly, the do with a clear opening of 17 inches 5 feet, 2 inches, are controlled b worm and gear mechanism which parts uniform motion to enable erator to give them a steady of discharge.

Side doors are operated from t respective sides while the ce doors can be operated from eit side of the car. Cars, themsel measure 41 feet, 8 inches in len over the striking castings. C capacity is 2775 cubic feet and pacity is 159,000 pounds.

Sure Way to Avoid Secondary Operations is to tool-up with

P&J TOOLING on the P&J AUTOMATIC



A case in point is *multiple drilling*; the tool that does the trick is the P&J self-driven Multiple Spindle Drill Head. It drills, countersinks or reams any number of holes to precision specifications for size, location and alignment — all in the one holding, as the conventional part of a sequence of high speed, fully automatic chucking and turning. That's P&J Tooling on the P&J Automatic! They team-up together to combine cuts . . . to reduce machining time . . . to eliminate extra work handling . . . to save time and money. Production Tooling Headquarters will engineer your tooling for better work, and more of it at the lowest cost per unit. Get a P&J cost and time estimate, and compare. Simply send sample parts or prints; there's no obligation.

Performance Features of the P&J SELF-DRIVEN MULTIPLE SPINDLE DRILL HEAD

As the turret of the P&J Automatic indexes into exact alignment, the P&J Multiple Spindle Drill Head engages with the work chuck which rotates the Drill Head. The drive is transmitted through gears and pinions to the drills, establishing correct speed ratios to finish the job to perfection in the fastest possible time. Action, including feed, is fully automatic.

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FUNDAMENTALS of STEELMAKING

NUMBER 16 OF SERIES

Another in a continuing series of articles on the making of steel and finishing it into products ready for the consumer. Each article is written by an outstanding authority in his particular field.

IRON ORE

Its Mining, Beneficiation and Reserves

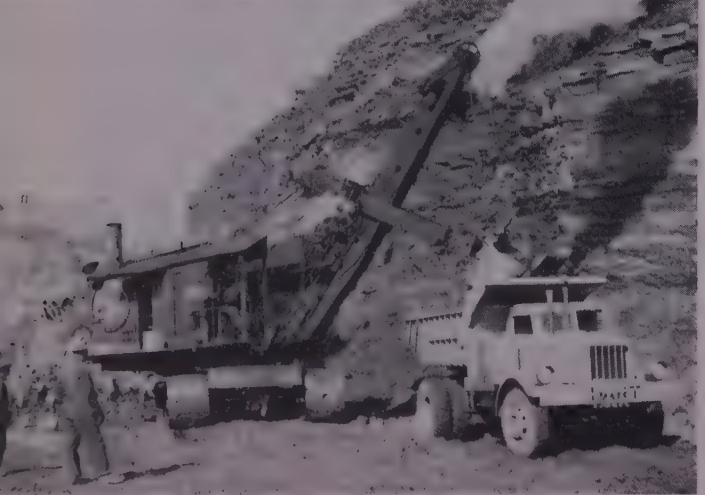
Mining, both open pit and underground, is described by the author together with discussions regarding taconite rock as a substitute for the gradually declining Mesabi ore. Other domestic sources are also listed

By E. W. DAVIS
Director, Mines Experiment Station
University of Minnesota
Minneapolis

PART I

DURING the past 30 years the iron ore mining industry of the United States has grown larger and has become more efficiently mechanized but its broader aspects and objectives have changed but little. The same types of ore are still mined largely from the same general areas as in the past. Ore still is transported to the blast furnaces in railroad cars and boats and is smelted into pig iron by use of coke and limestone just as it was done 30 years ago. Mines are larger and deeper, cars and boats carry greater loads and move more swiftly, but the nature and quality of the ore have not changed materially and the great mining districts, and even the great mines of 30 years ago, today remain the outstanding producers.

Fig. 1—Iron ore cleanup is being loaded into heavy-duty trucks by power shovel



Greatest producer of all has been the Hull-R Mahoning pit at Hibbing, Minnesota, on the Mes range. Today it is slowly approaching exhaust but output from this one pit during the peak-war y of 1942 almost equalled the total 1942 United Sta production outside of Minnesota. As seen to the pit is 3 miles long and from one-half to one m wide having a maximum depth of 435 feet. It first opened in 1895, and from it 438 million tons ore have been removed. To uncover this ore, million tons of waste material, sand, gravel and r have been removed making this pit the greatest m made excavation in the world. Nearly one-th of all the ore produced from the Mesabi range come from this great mine.

Ore is mined by great electric shovels, scoop up as much as 13 tons at each bite. The sho swing and dump the ore into railroad cars that pushed out of the pit by some of the world's m powerful locomotives. These cars hold 70 tons ore and are formed into 150 to 200-car trains wh travel the 90 miles to Duluth in a few hours. Duluth, the ore is dumped into loading docks, from them, into ore boats which make the trip do Lake Superior through the Sault Ste. Marie lo and through Lake Michigan or through Lake Hu and Lake Erie to the steel plants.

The Mesabi stretches across northern Minnes roughly parallel to the north shore of Lake Super for over 100 miles. In 1942, the year of great production, the Mesabi produced 70 million tons, 67 per cent of the total United States producti This great range was originally an old ocean

Photographs used to illustrate this series of articles concerned iron ore were generously furnished by United States Steel Corp., Re lic Steel Corp., Jones & Laughlin Steel Corp., M. A. Hanna Co. Pickands Mather & Co.

ON ORE

beach upon which iron-bearing silts and rock re deposited millions of years ago to a depth of veral hundred feet. Time and pressure from over- ng rocks, and later from great sheets of ice, con- lidated these silts into hard, iron-bearing rock, lled taconite. Glaciers passed over this area several nes scouring away much of the overlying rocks d leaving behind glacial debris of sand and gravel nen they retreated.

As we find the Mesabi today the taconite rock, ntaining about 30 per cent iron, still slopes gently ward the southeast in a great sheet 600 feet thick d over 100 miles long. Along its northwestern undary it is exposed in many places, but at dis- nces of from 1 to 3 miles it dips under the overly- g slates. Glacial drift covers the area thinly toward e north but more deeply toward the south, reach- g a depth of 200 to 300 feet.

Spotted here and there along its immense sheet taconite—like raisins in a cake—are the great e mines which provide nearly two-thirds of the tal United States production. In the area of these ines percolating waters—over long periods of years have altered the old taconite rock and dissolved t much of the silicious material, leaving the en- ched iron ore behind, assaying from 40 to 65 per cent on. These troughs and basins of enriched ore vary normously in size—from small pockets in the tacon- e to the great area in Hibbing which forms the ull-Rust-Mahoning mine. These enriched areas are w and widely scattered toward the eastern end the range but they increase in occurrence in the ntral portion, with possibly the greatest concentra-

The author, a native of Cambridge City, Ind., was graduated from Purdue University in 1911 with an electrical engineering degree.

He was employed at the University of Minnesota in 1912 as an instructor of mathematics. From 1915 to 1918 he served as engineer for the Mesabi Iron Co. and in 1918 returned to the University of Minnesota becoming director of the Mines Experiment Station, the position he holds today.

As station director, he has made many important discoveries advantageous to the iron ore mining industry of Minnesota. Much of his work has had to do with the various processes of concentration, and he has long preached the necessity for improved mechanical handling of low-grade ores.

He has been interested in taconite beneficiation since the formation in 1915 of the original Mesabi Iron Co., at Babbitt, Minn. and has had experience with the concentration of iron ore from many localities in this country and abroad.

He is a member of the American Mining Congress, American Institute of Mining and Metallurgical Engineers, A. A. A. S., and Eastern States Blast Furnace and Coke Oven Association. He is the author of many articles and has been granted several patents.

TABLE I

ANNUAL SHIPMENTS OF IRON ORE IN UNITED STATES, 1911–1948 (In Thousands of Gross Tons)
(Exclusive of ore Containing 5% or more of manganese and of ore sold for paint)

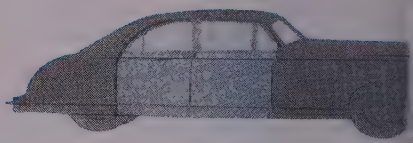
ear	Lake Superior District	Alabama	California	Georgia	Missouri	New Jersey	New York & Pennsylvania	Texas	Utah	Wyoming	Other States	Total United States
11	32,903	3,956	(a)	207	73	360	1,573	...	35	(a)	1,985	41,092
12	48,199	4,777	(a)	135	42	367	1,689	(a)	7	(a)	1,802	57,018
13	50,168	5,333	(a)	153	37	292	1,900	(a)	15	(a)	1,745	59,643
14	32,424	4,515	1	66	36	347	1,040	...	(a)	(a)	1,285	39,744
15	47,334	5,135	1	102	40	391	1,299	...	(a)	(a)	1,191	55,193
16	66,394	6,802	3	252	35	528	2,024	...	(a)	(a)	1,833	77,871
17	63,854	7,102	2	212	39	475	1,905	...	(a)	(a)	1,984	75,573
18	62,018	6,121	3	262	72	375	1,416	(a)	53	(a)	1,701	72,021
19	48,341	4,895	2	74	54	337	1,318	(a)	44	(a)	1,306	56,371
20	59,677	5,833	7	104	51	417	1,679	(a)	36	(a)	1,477	69,281
21	22,779	2,836	2	4	36	115	361	(b)	61	235	224	26,653
22	43,462	5,295	3	29	58	90	974	...	15	333	354	50,613
23	59,452	6,923	3	117	54	349	1,711	...	58	379	765	69,811
24	43,111	6,558	(b)	112	80	101	1,110	...	164	363	484	52,083
25	54,209	6,891	(b)	79	40	165	1,331	...	269	490	451	63,925
26	58,900	6,871	(b)	52	124	212	1,749	...	297	630	458	69,293
27	51,034	6,508	...	50	79	203	2,062	...	223	603	470	61,232
28	53,764	6,160	...	73	95	351	1,782	...	321	491	396	63,433
29	65,099	6,637	...	59	171	285	2,027	...	325	639	361	75,603
30	46,469	5,638	...	52	133	392	1,649	...	279	320	269	55,201
31	23,248	3,630	...	21	112	240	696	...	184	181	204	28,516
32	3,578	1,470	...	1	25	15	105	...	137	...	...	5,331
33	21,497	2,156	...	(b)	...	73	487	...	95	289	27	24,624
34	21,862	2,721	16	1	4	145	760	...	161	117	6	25,793
35	27,993	3,560	19	3	2	83	1,246	...	161	339	20	33,426
36	44,349	4,260	31	6	3	194	1,906	...	154	507	56	51,466
37	61,925	6,350	(b)	15	20	545	2,547	...	189	708	49	72,348
38	19,254	4,281	28	9	21	140	2,233	...	170	276	19	26,431
39	44,784	5,985	17	26	37	395	2,694	6	262	588	33	54,827
40	62,884	7,330	1	100	50	694	2,943	7	327	831	31	75,198
41	79,564	7,873	54	259	13	667	3,266	11	355	986	6	93,054
42	91,543	8,845	93	298	56	603	2,473	(b)	320	957	126	105,314
43	84,537	8,060	729	413	53	522	2,697	7	912	814	73	98,817
44	80,679	6,808	634	286	19	499	3,005	278	1,541	714	82	94,545
45	74,699	6,039	326	276	113	429	2,940	217(c)	1,926	606	10	87,581
46	58,631	5,994	226	285	156	419	1,811	21	1,321	619	11	69,494
47	76,945	7,207	374	296	171	469	3,432	289	2,821	651	15	92,670
948(d)	82,520	7,860	352	283	146	433	4,073	752	3,172	695	22	100,308
911–1948 ..	1,970,083	215,215	2,927	4,772	2,362	12,717	69,913	1,588	16,410	14,361	21,331	2,331,667

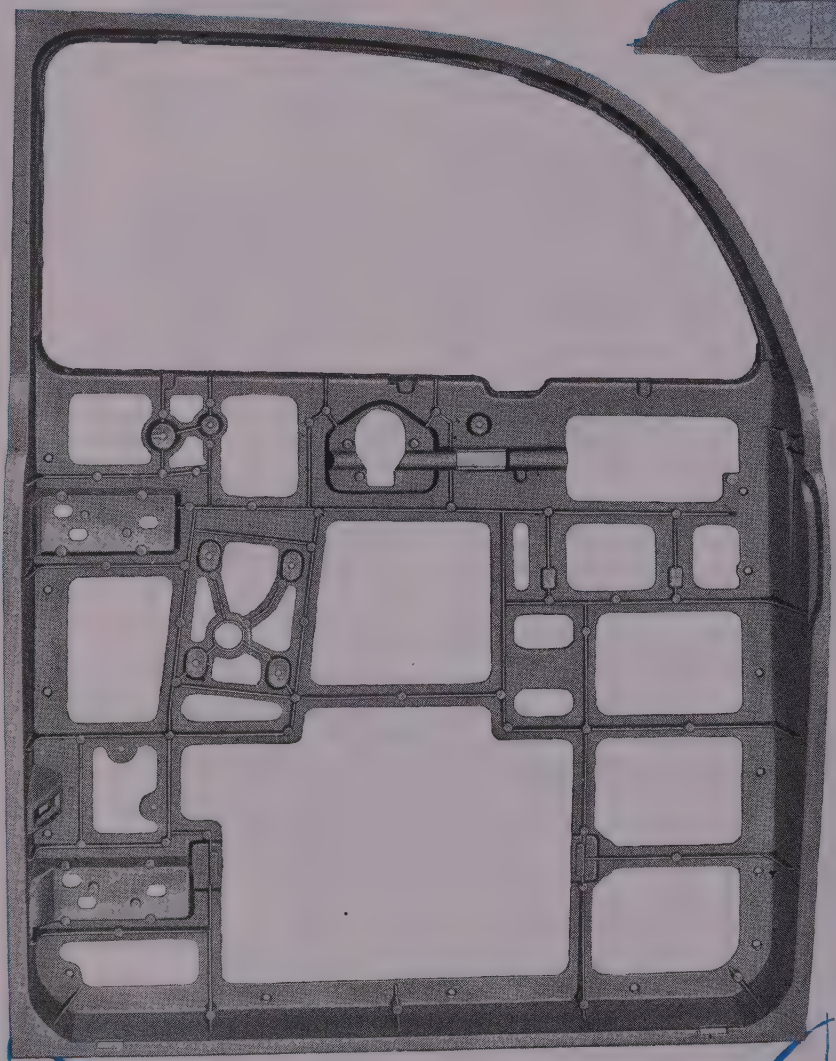
(a) Tonnage included in "Other States."
(b) Less than 500 tons.
Authority: U. S. Department of the Interior—Bureau of Mines.

(c) Includes some ore shipped from Virginia.
(d) Estimates.

DIE CAST AUTO DOOR

ASSEMBLED





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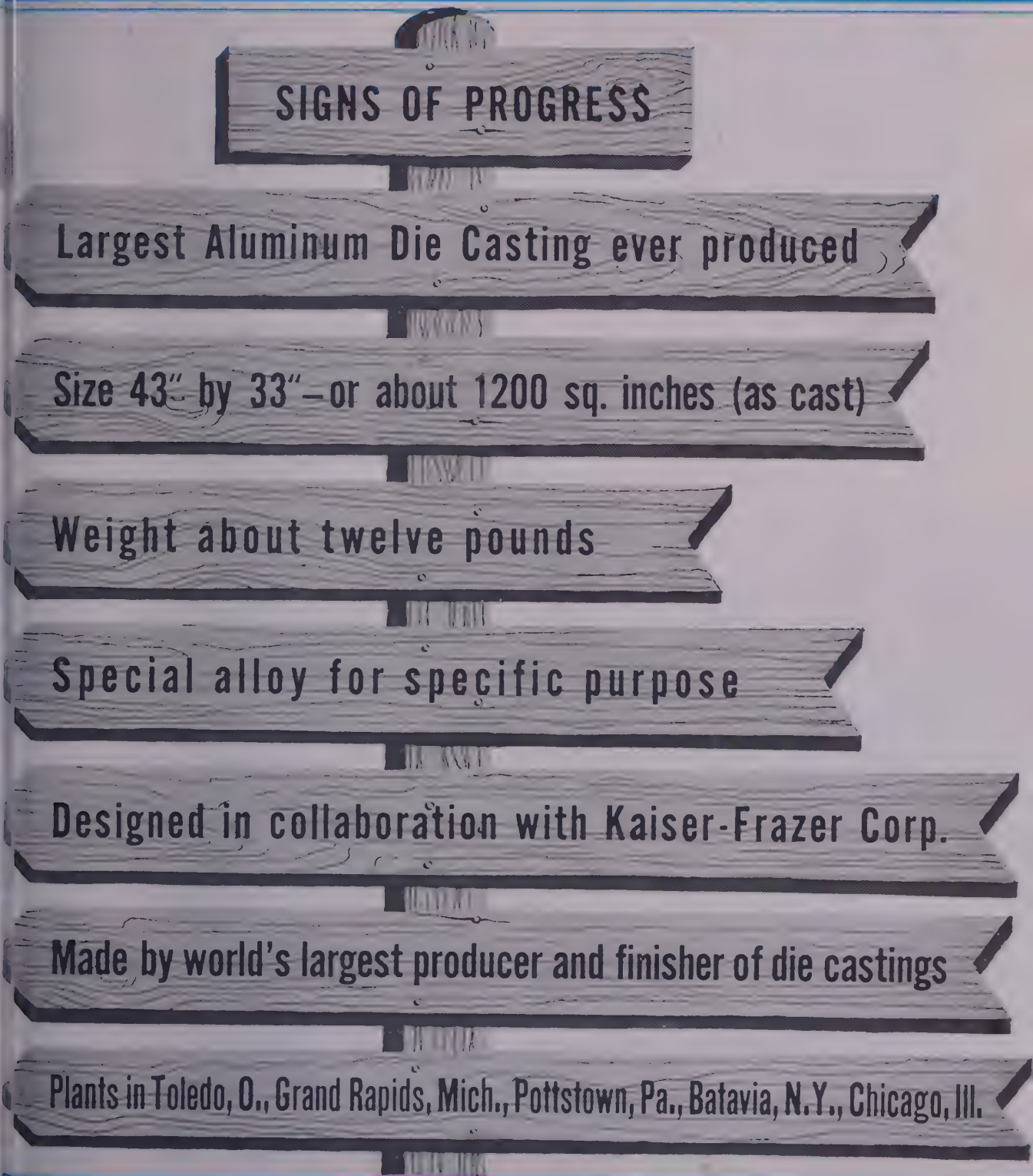
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tion of high-grade ore in the vicinity of Hibbing. Further west in many of the areas, the enrichment has not progressed far enough to produce high-grade, direct-shipping ore, and in these areas the mining companies have built great plants in which the ore is crushed, screened and washed to remove more of the silicious material and complete the job that nature did not finish.

The Mesabi, then, is made up of three types of iron-bearing material—(1) direct-shipping ore which is transported to the steel plants as mined, (2) intermediate ore which can be concentrated by rather simple processes before shipment, and (3) taconite, the low-grade, iron-bearing mother rock of the range requiring elaborate processing before it can be utilized and just now beginning to receive the attention of the mining companies.

Iron-bearing materials of the Mesabi can be classified in still another way, depending upon mining methods required. In most areas, the overlying glacial drift is so thin that open pit or strip mining methods can be used, but in some places the surface is so deep that the ore is mined by underground operation. There is a very important distinction between open pit and underground mining methods because of the cost of production. It normally tak five times as many man-hours of work to produ a given tonnage of underground ore on the Mesa as it does to produce this same tonnage of ore fr an open pit property. For this reason, most of t ore is produced by open pit mining, even when t surface to be stripped off is up to 200 feet de Underground mining is expensive on the Mesabi l cause ore beds are wide and comparatively shall which demands support of the surface with timb steel, or concrete over a large area while the ore being removed. Only a small amount of undergrou ore is produced although 350 million tons are s available for this type of mining.

Great value of the Mesabi to the nation beyo just the bulk of ore that it has produced has be the amount of flexibility afforded the steel indust During peace times, demand for ore has fluctuat widely over the years, and with the approach of t late war, production was smoothly increased fr 13 million tons in 1938 to 70 million tons in 19 To double production from the great Mesabi pits is only necessary to put a few more shovels and few more men to work. Five thousand men p duced 13 million tons in 1938 and 11,000 men p duced 70 million tons in 1942. This large increa

Fig. 2—View of an open pit in the Mesabi range

TABLE II
ANNUAL SHIPMENTS OF IRON ORE FROM THE LAKE SUPERIOR DISTRICT—BY RANGES
(In thousands of gross tons)

Year	Mesabi Range	Vermilion Range	Cuyuna Range	Southeastern Minnesota	Gogebic Range	Marquette Range	Menominee Range	Mayville-Baraboo Ranges	Canadian Ranges	Total Lake Superior District
r to 1854	.....	.....	....	...	....	74	....	200	....	274
-1860	.....	.....	....	...	....	243	....	...	....	243
1870	.....	.....	....	...	....	3,597	....	...	....	3,597
1880	.....	.....	....	...	....	10,345	901	...	....	11,246
1890	.....	3,223	....	...	8,470	18,749	11,936	...	....	42,378
1900	31,390	11,968	....	...	22,731	26,825	21,196	127	65	114,302
1910	193,496	15,138	....	...	34,021	36,744	41,419	843	1,825	323,486
11	22,099	1,089	148	...	2,603	2,836	3,911	116	155	32,957
12	32,045	1,845	305	...	5,006	4,203	4,712	104	88	48,308
13	34,040	1,567	733	...	4,532	3,968	4,967	145	165	50,117
14	21,467	1,017	868	...	3,569	2,492	3,222	106	209	32,950
15	29,757	1,733	1,128	...	5,478	4,106	4,983	81	369	47,635
16	42,526	1,947	1,716	...	8,490	5,410	6,365	219	230	66,903
17	41,440	1,531	2,422	....	7,980	4,874	6,046	137	265	64,695
18	40,399	1,193	2,479	...	7,937	4,354	6,379	98	188	63,027
19	32,004	929	1,859	...	6,229	2,992	4,447	93	168	48,721
20	37,150	1,008	2,192	...	8,763	4,608	6,569	130	114	60,534
21	16,350	869	490	...	2,337	1,117	1,584	52	53	22,852
22	28,064	1,212	1,496	...	6,221	2,818	4,080	110	15	44,016
23	41,806	1,279	2,221	...	6,580	3,892	4,856	138	27	60,799
24	29,142	978	1,469	...	5.160	3,175	3,837	135	(a)	43,896
25	35,890	1,438	1,514	...	7,068	4,198	5,270	157	...	55,535
26	38,251	1,586	2,083	...	7,537	4,435	5,946	132	...	59,970
27	32,975	1,548	1,981	...	6,386	4,148	5,213	93	...	52,344
28	35,399	1,671	2,098	...	6,540	4,299	4,842	7	...	54,856
29	43,008	1,874	2,596	...	7,624	5,410	5,645	...	...	66,157
30	31,067	1,885	1,929	...	5,064	3,634	3,609	...	...	47,188
31	15,271	1,141	898	...	2,908	1,809	1,469	...	...	23,496
32	1,935	217	99	...	673	357	308	...	...	3,589
33	13,472	740	741	...	2,401	2,807	1,511	...	...	21,672
34	14,650	785	533	...	2,287	2,474	1,335	...	...	22,064
35	18,877	857	798	...	3,071	3,266	1,634	...	...	28,503
36	31,459	1,065	1,305	...	4,630	4,628	2,164	...	...	45,251
37	45,933	1,453	1,775	...	5,661	5,748	2,649	...	...	63,219
38	13,304	930	582	...	2,278	1,476	980	...	...	19,550
39	30,315	1,417	1,291	...	5,346	4,908	2,160	...	111	45,548
40	45,668	1,548	1,734	...	5,976	5,920	3,103	...	361	64,310
41	59,773	1,847	2,441	(a)	6,301	6,255	4,131	...	463	81,211
42	70,280	1,925	3,035	59	6,238	6,541	4,930	...	487	93,495
43	64,906	1,779	3,066	220	5,487	5,601	4,903	...	451	86,413
44	62,509	1,539	2,539	...	5,604	4,790	4,876	...	499	82,356
45	58,369	1,446	3,016	...	4,304	4,585	4,241	...	1,019	76,980
46	46,326	1,330	2,354	...	3,717	3,270	2,590	...	1,441	61,028
47	59,079	1,430	2,860	148	5,253	5,543	3,668	...	1,704	79,685
48	64,047	1,560	3,149	353	5,384	4,898	4,094	...	1,208	84,693
nd Total	1,605,938	81,537	63,943	780	263,845	248,422	222,681	3,223	11,680	2,502,049

(a) Less than 500 tons.
Authority: The Lake Superior Iron Ore Association.

production was accomplished without any fuss, mmotion or government subsidy. Never for a ment during the war was a single blast furnace ecked because of an actual or threatened ore short- e and Mesabi ore was shipped to such distant steel oducing centers as Sparrows Point, Md., to keep

Fig. 3—Miners use compressed air drills to cut blast holes in the ore vein of an upper New York state underground mine

steel production at a peak. With exhaustion of the great Mesabi pits, this flexibility will gradually be lost to the nation because, as far as is known, no other district can produce any large quantity of open pit ore.

One reason for this situation is that in all of the other large producing areas the ore beds dip steeply into the earth and underground mining methods are required. When an underground mine is developed to produce a million tons of shipping grade ore per year—and very few of them can produce this much —it is only with a greatly enlarged labor force and after several years of development work that production can be raised to 2 or 3 million tons per year.

When the Mesabi open pits are depleted and the nation must depend upon underground and concentrated ores for its supply, greatly increased stockpiles near the furnaces will probably be required in order to secure the flexibility so necessary in the steel industry. As it is now, ore from the Lake Superior areas is not shipped during the winter months because the lakes are frozen, and for this reason, it is necessary to ship sufficient ore during the 8 or 9 summer months to carry the steel plants safely through the winter. This means stockpiles of ore near the furnaces normally totaling 40 to 45 million tons on December 1 of each year. By April 1 these have decreased to approximately 20 to 25 million tons. This is called the annual "carry over" and when rate of consumption is high it may amount to only a few weeks supply when navigation opens in the spring. With exhaustion of the Mesabi open

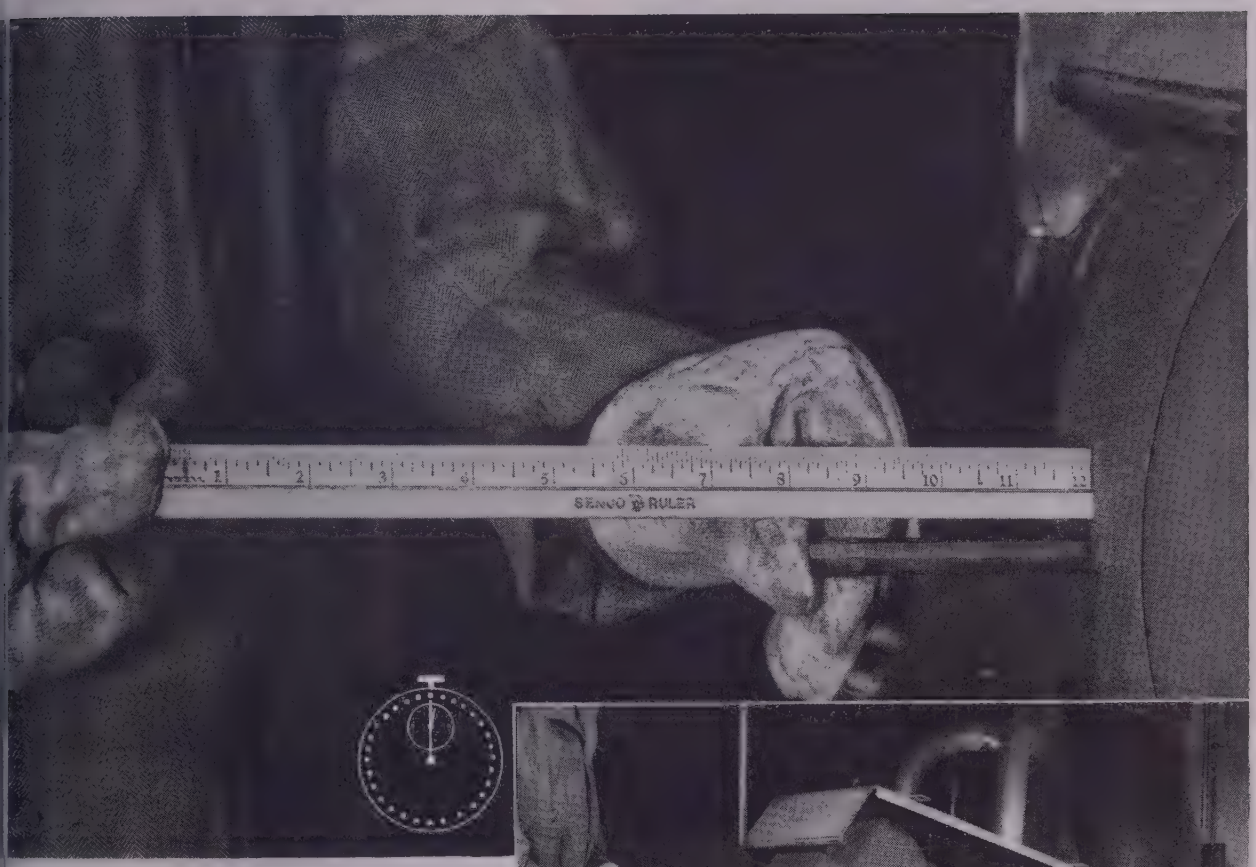
PICTURE STORY *Illustrating*

the speed and cutting pow

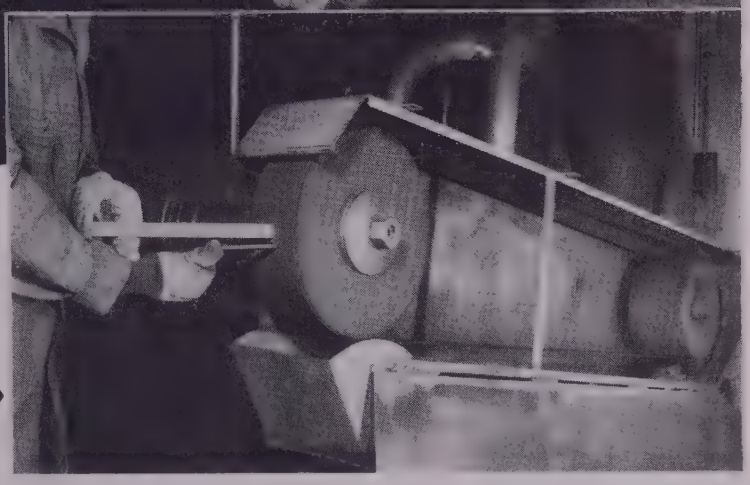
1. We took a forged steel chisel, one-half inch in diameter, and started grinding POINT FIRST against a Grit 36 Three-M-ite Belt.

2. After twenty seconds we'd ground away over 3½ inches of chisel, (the belt travelling over two miles a minute).

3M Abrasive Belts . . .



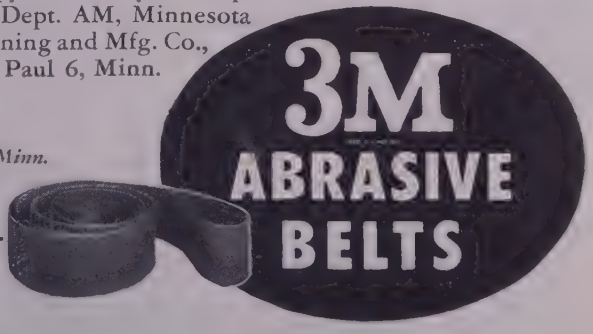
3. After sixty seconds, 8½ inches of forged steel chisel was ground down, and there's still plenty of life left in the belt.



4. Standard equipment used for the test: a 5 H.P. lathe, Grit 36 Three-M-ite Resin Bond Belt, and a 16" 'K' Type Contact Wheel. (Guard removed for photo).

THIS unusual test is our way of dramatizing a new production principle, heavy grinding of ferrous or non-ferrous metals with 3M Coated Abrasive Belts.

In case you're not familiar with the speed and cutting power of 3M Abrasive Belts on heavy grinding jobs requiring a high rate of stock removal—we've compiled a booklet that's replete with "case histories" illustrating the potentialities of this modern grinding tool. To get your copy address your request to Dept. AM, Minnesota Mining and Mfg. Co., St. Paul 6, Minn.



...de in U.S.A. by **MINNESOTA MINING & MFG. CO.** *St. Paul 6, Minn.*

...kers of "SCOTCH" Brand Pressure-Sensitive Tapes, "UNDERSEAL" Rubberized Undercoating, "SCOTCHLITE" Reflective Sheeting, "SAFETY-WALK" Non-Slip Surfacing, "3M" Adhesives.

General Export: Durex Abrasives Corp., New Rochelle, N. Y.
In Canada: Canadian Durex Abrasives Ltd., Brantford, Ontario

Fig. 4—Underground scraping is being performed with this modern travelling unit which is controlled by another operator at the delivery end of the stope

pits this "carry over" must be greatly increased in order to accommodate national emergencies, if for no other reason. Estimates have been made that emergency stockpiles near the furnaces should total 200 or 300 million tons. Accumulating and maintaining such great stockpiles will involve an enormous cost but this expense will, of course, be unnecessary as long as open pit ore is readily available.

Production from other iron ore producing distri in the United States seems small when compared w the Mesabi, but nevertheless, they are importan some especially important—because of the nature the ore they produce and some on account of th geographical locations. The so-called Lake Super district of the United States includes five produc ranges beside the great Mesabi. Production in n lions of tons from these ranges for the war year 1942—when all operations were at the peak—w as follows: Mesabi 70.3, Vermilion 1.9, Cuyuna Gogebic 6.2, Marquette 6.5, Menominee 4.9, for a tal of 92.8.

Vermilion range ore is hard, dense hematite ti is used principally in open-hearth steel furnac It is mined by underground methods and the V milion has been a consistent shipper of high-grade at the rate of 1 to 2 million tons annually duri the past 60 years.

Cuyuna range ore is softer, and like weste Mesabi ore, much of it requires beneficiation. large part of Cuyuna range ore contains from to 10 per cent manganese, and for this reason, frequently mixed with other low manganese ores blast furnace smelting. The Cuyuna contains b open pit and underground mines, but in recent yea most of the ore has come from the open pits.

The Marquette, Gogebic, and Menominee rang produce principally underground, direct-shipping of a hard, lumpy type. Some of the mines are ve deep for iron mines, the Eureka being 3600 f below the surface. These ranges have been ve consistent producers during the past 60 years a currently provide from 10 to 15 million tons annual Total production from Marquette and Gogebic rang has been about equal, with the Menominee runni slightly behind the other two. The Gogebic li

TABLE III

ANNUAL SHIPMENTS OF CONCENTRATED IRON ORE IN UNITED STATES, 1914–1948

(Exclusive of ore containing 5% or more of manganese)
(In Thousands of Gross Tons

Year	Lake Superior District	Alabama	Georgia	Missouri	New Jersey	New York & Pennsylvania		Other States	Total United St
1914(a)	2,184	642	...	...	251	678		375	4,130
1915	3,172	744	62	...	360	847		396	5,581
1916	4,576	996	105	...	528	1,251		649	8,105
1917	4,577	1,160	88	...	471	1,174		697	8,167
1918	5,012	987	107	...	370	990		416	7,882
1919	4,875	863	63	...	337	854		364	7,356
1920	5,216	1,074	61	...	417	1,306		441	8,515
1921	2,936	328	(b)	...	115	260		89	3,728
1922	4,621	803	22	...	90	734		353	6,623
1923	7,631	1,003	90	29	309	1,282		343	10,687
1924	5,249	752	60	57	100	697		178	7,093
1925	6,516	755	67	4	162	1,056		176	8,736
1926	5,549	634	52	79	208	1,468		382	8,372
1927	5,041	608	49	48	201	1,780		388	8,115
1928	5,504	650	73	70	348	1,556		420	8,621
1929	6,523	623	58	137	284	1,521		278	9,424
1930	6,316	587	52	97	391	1,356		175	8,974
1931	3,574	209	14	5	240	534		100	4,676
1932	292	31	...	...	15	69		...	407
1933	2,911	183	...	...	73	363		26	3,556
1934	3,246	213	...	...	145	538		4	4,146
1935	4,874	226	...	...	80	872		15	6,067
1936	7,511	380	...	...	193	1,547		28	9,659
1937	9,397	532	...	...	543	1,854		24	12,350
1938	2,806	264	...	...	140	1,613		13	4,836
1939	6,659	471	12	...	321	1,933		30	9,426
1940	9,354	750	41	...	604	2,149		28	12,926
1941	14,847	1,231	246	...	666	2,375		11	19,376
1942	17,448	2,497	294	6	492	2,334		...	23,071
1943	14,945	2,132	411	...	346	2,508	Texas	...	20,342
1944	14,673	1,800	285	...	380	2,782	276	...	20,196
1945	14,459	1,341	276	109	299	2,780	216	...	19,480
1946	11,549	1,532	285	156	276	1,742	20	...	15,560
1947	15,311	1,764	296	171	314	3,234	289	...	21,379
1948	(c)	(c)	(c)	(c)	(c)	(c)	(c)		(c)

(a) Data on concentrated ore shipped prior to 1914 not available.
(b) Included in "Other States."
(c) Figures not available.
Authority: Department of the Interior—Bureau of Mines.

tly in Michigan and partly in Wisconsin, produc- from the Wisconsin area being consistently less n from the Michigan portion of the range. Among states, Michigan is the second largest ore pro- er, being surpassed only by the state of Minne- a.

During recent years there has been a revival of ore mining in the state of New York. Several properties have been revitalized and some new as have been opened. Most of the ore is a hard, se, low-grade magnetite requiring extensive bene- iation. The largest ore bed at Mineville was opened 1846, and the Lyon Mountain property in 1873. Benson and Clifton properties were put into duction about 75 years ago and the MacIntyre king about 100 years ago. MacIntyre ore is high in nium, and both high-grade titanium concentrate iron ore concentrate are produced. Total produc- from New York has been increasing and reached rly 3 million tons recently. This ore goes princi- y to furnaces in the Pittsburgh area and, there- e, supplements shipments from Minnesota and higan.

he Cornwall mine in Pennsylvania has been pro- ing iron ore since about 1735. This ore was origi- y mined by open pit methods but now much of comes from underground workings. It is a com- atively soft, low-grade, magnetite ore requiring eficiation. By-products of copper, cobalt, and phur are recovered in the concentrating plant at anon, Pa. Production of concentrate from the Cornwall mine has been about a million tons a year for a great many years.

Ordinarily, something less than half a million tons of ore is produced annually in New Jersey being a low-grade magnetite mined by underground methods and requiring extensive concentration. The Mt. Hope and Scrub Oaks properties have been operating since 1856.

The third largest iron-ore producing state is Alabama. The Birmingham district normally produces from 6 to 8 million tons of ore annually, principally from underground properties which is low-grade, but because of the close proximity of the fuels and fluxes, can be used economically without concentration. The ore is principally a red, oolitic hematite, much of it containing considerable lime. In recent years beneficiation operations have begun to appear in the Birmingham area but rather elaborate concentration processing is required because of the nature of the minerals. The Birmingham district has been producing iron ore and pig iron since 1876.

Since World War II, an iron-producing district has been developed in northeastern Texas. The ore is shipped either to Houston or to the new furnace plant at Daingerfield. It is of a soft, earthy structure occurring in thin, shallow layers and mined by open pit methods. It requires extensive beneficiation and only small tonnages have been produced to date, but with the starting of a new furnace plant at Daingerfield, production will probably increase.

Utah is becoming a large ore producer, having re-

TABLE IV

ANNUAL SHIPMENTS OF CONCENTRATED IRON ORE FROM LAKE SUPERIOR DISTRICT, 1907-1948

(In Thousands of Gross Tons)

ar	Minnesota						
	Mesabi Range	Cuyuna Range	Southeastern Minnesota	Total Minnesota	Michigan & Wisconsin	Canada	Total Lake Superior District
1910	668	...	...	668	...	101	769
1	1,978	...	...	1,978	...	7	1,985
2	3,091	...	...	3,091	...	39	3,130
3	2,249	...	...	2,249	...	122	2,371
4	2,014	...	...	2,014	...	129	2,143
5	2,857	112	...	2,969	...	148	3,117
6	4,080	155	...	4,235	...	193	4,428
7	4,414	100	...	4,514	...	175	4,689
8	4,856	60	...	4,916	...	183	5,099
9	4,578	...	...	4,578	...	168	4,746
0	5,034	...	...	5,034	...	114	5,148
1	3,055	6	...	3,061	...	53	3,114
2	4,597	420	...	5,017	...	14	5,031
3	7,276	337	...	7,613	...	27	7,640
4	4,947	384	...	5,331	124[a]	...	5,455
5	6,302	265	...	6,567	106	...	6,673
6	5,239	319	...	5,558	126	...	5,684
7	4,768	305	...	5,073	88	...	5,161
8	5,267	574	...	5,841	7	...	5,848
9	5,950	617	...	6,567	...	...	6,567
0	5,840	500	...	6,340	...	...	6,340
1	3,458	238	...	3,696	...	...	3,696
2	277	15	...	292	...	...	292
3	2,827	308	...	3,135	...	...	3,135
4	3,072	368	...	3,440	...	...	3,440
5	4,590	564	...	5,154	...	...	5,154
6	7,055	709	...	7,764	...	...	7,764
7	8,700	992	...	9,692	...	...	9,692
8	2,675	151	...	2,826	...	...	2,826
9	5,574	647	...	6,221	...	111	6,332
0	8,361	772	...	9,207[b]	...	361	9,568
1	13,453	1,166	(c)	14,713[b]	...	463	15,176
2	16,439	1,421	59	17,966[b]	...	487	18,453
3	13,750	1,484	220	15,454	...	451	15,905
4	13,838	1,191	...	15,029	...	482	15,511
5	14,019	1,442	...	15,461	16	513	15,990
6	10,578	1,201	...	11,779	31	552	12,362
7	14,798	1,758	148	16,704	46	496	17,246
8	15,979	1,651	353	17,983	...	522	18,505
al	248,503	20,232	780	269,730[b]	544	5,911	276,185

) Estimated. No figures on concentrates shipments from Michigan-Wisconsin compiled prior to 1924.
) Includes small tonnage of concentrates shipped from Vermilion Range.
) Less than 500 tons.
uthority: Data for Minnesota compiled by Mines Experiment Station, Univ. of Minnesota, and Lake Superior Iron Ore Association. Data for gan-Wisconsin and Canada compiled by Lake Superior Iron Ore Association.

cently passed New York with shipments of nearly 3 million tons. With the continued operation of the new steel plant at Geneva, this state and Wyoming may develop into ore-producing areas of major importance. Ore is mined largely by open pit methods and some of it is beneficiated. Sufficient ore and fuel seem to be available to support a larger steel industry when market conditions justify such an expansion.

Iron and steel production in California has recently gained prominence with the erection of a new furnace plant at Fontana. Current ore production is only two or three hundred thousand tons per year but this can be expanded as demand warrants. The district is handicapped because of the lack of good coking coal which must be shipped in from a considerable distance.

In Missouri the old Iron Mountain district has recently been reopened. Its ore is mined by open pit methods and requires beneficiation. Current production is from one to two hundred thousand tons year. This property was originally opened in and operated intermittently until 1930. It was op again in 1944 and is now expected to stay in o tion for some time.

(*To be continued*)

REPRINTS AVAILABLE

REPRINTS of previous articles in the serie "Fundamentals of Steelmaking" now may be ob tained by addressing Reader's Service Depart ment, STEEL, 1213 W. Third St., Cleveland 13 O. Subjects covered over the past few month include blast furnace, open hearth and electri furnace practice, tool steels, roll design, cok production, plates, sheets and strip, tin plate structurals and rails, scrap bessemer steel, but and lap weld pipe and seamless tubing.

Factory Building "Pressurized"

BECAUSE ventilating equipment removes some of the air from the "tightly built" plant of Signode Steel Strapping Co., Baltimore, and because only a small amount of air can infiltrate, it was necessary to devise a means of keeping the plant interior under positive pressure to prevent cold air from rushing in through frequently opened railroad and truck shipping doors. The "pressurizing" system evolved by the company's engineers consisted of using oil-fired heating equipment that pulls in fresh air from outside through a duct, heats and distributes it throughout the building and at the same time keeping the air pressure balanced, or, at times, even positive. In effect, the heating system claims to build up a "wall" of warm air to repel the cold at open doorways.

The 26 x 140 x 360 ft building is undivided by partition walls except for offices and locker rooms; about half the floor space is used for manufacturing steel strappings and the other half is used by packing, shipping and receiving departments. Three Counterflo direct-fired warm air heaters, built by Dravo Corp. of Pittsburgh, heat the factory building. Two of the units operate entirely on recirculated air drawn from the plant's floor level and discharged overhead through directional nozzles.

The third heater, located in the center of the building, is equipped with a fresh-air intake duct and operates either with fresh or recirculated air. Three heaters each have an output capacity of 1,250,000 Btu per hour and handle approximately 14,000 cu ft of air per minute. Each services about 15,000 sq ft of floor area. A comfort zone extending from the floor to about 12 ft above the floor is established by the heater. Heat losses through the roof are minimized in this method of operation and floor drafts are said to be eliminated.

Electrode for Thin Gages

GALVANIZED surfaces may be welded without damage to the coating by a welding alloy that is adapted for single carbon arc welding. Produced by Eutectic Welding Alloys Corp., New York, the welding rod may be used with or without flux to produce distortion-free welds on steel, bronze or copper.

Most parts require no preheating. Heavy bronze castings require preheating to about 700° F. The alloy has a close color match to most red and phosphor bronzes and in these applications requires little or no preheating for thin parts. Bonding takes place at 1550° F and tensile strength is 51,000 psi.

Tubing Withstands 10,300 PSI

EXTREME pressure of 10,300 psi and a temperature of 1000° F call for tubing of unusual withstanding ability for use in the coal-to-oil demonstration plant opened by U. S. Bureau of Mines at Louisiana, Mo. Plants employ two different processes for conversion of coal and lignite into a full range of synthetic liquid fuels. The processes are known as direct hydrogenation and gas synthesis.

The complete process involves high temperatures and unusually high operating pressures which call for alloy tubing resistant to these factors as well as to corrosion. Several types of tubing made by Babcock & Wilcox Tube Co., Beaver Falls, Pa., are being used for valves and fitting well as for the piping system o paste preheater, splitting-phase and heat exchangers.

Tubing sizes used include 1 1/32 to 6 5/8 inches OD and 0.145 to 1.169 inches in wall t ness. Hot finished and cold d tubing in several grades is being Special operations such as polis the inside diameter, special ends center welding for length were formed in completing the variou quirements for the project. A example of the special operations formed, one lot of Croloy 9 alloy center-welded for strength and a cial end made from bored billet was fusion-welded to one end o long tube. The entire length then heat treated to obtain sp physical properties required.

Chemists' Association Manu

REVISED edition of the manu warning labels, published by M facturing Chemists' Association Washington, D. C., is broaden scope by the addition of new i mation. It is divided into three p General principles involved in d and preparation of warning for hazardous chemicals; 180 trative warning labels for indu chemicals; and 58 illustrative ing labels for economic poisons

Also available from the associ is chemical safety data sheet on methyl bromide which pre essential information for the handling and use of this che Covered are physical and che properties, shipping containers methods for their unloading emptying and container storag handling as well as recommende sonal protective equipment.

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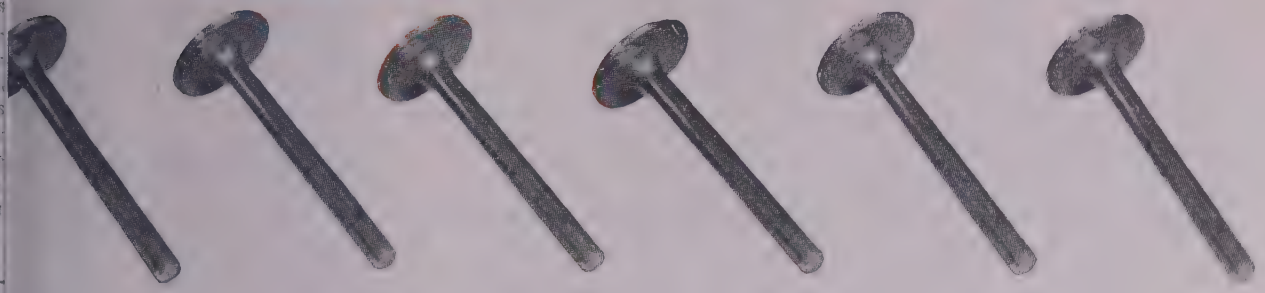

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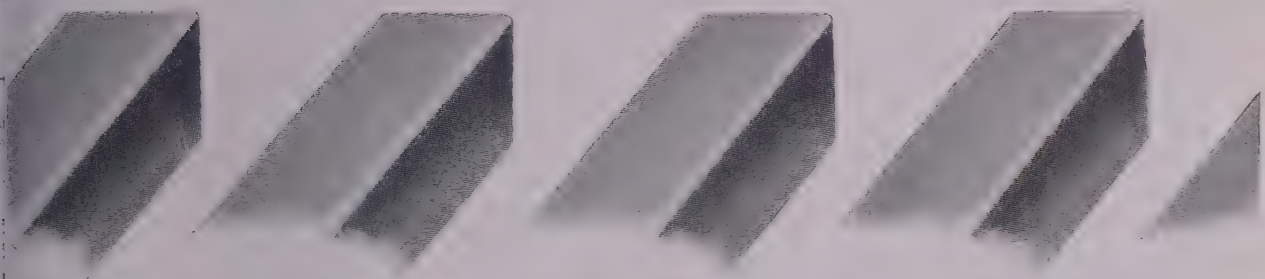

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Temper Brittleness

(*Concluded from Page 89*)

reducing temper brittleness by lowering the alloy content. In these thicknesses a microstructure of tempered bainite with little temper brittleness is likely to be tougher than tempered martensite with severe temper brittleness. (This is, of course, a partial exception to rule three which has already been discussed.)

Fifth, keep the phosphorus content as low as possible. 0.20 per cent phosphorus is better than 0.40 per cent, and 0.10 per cent is better than 0.20 per cent. Sixth, use molybdenum in the steel, up to 0.50-0.60 per cent if necessary.

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Steel Analyzed in 2 Minutes

BY a direct reading method of analysis for stainless and tool steels, the total time of analysis for all metallic elements is 2 to 3 minutes, including sample preparation. The equipment, consisting of a two-meter spectrometer, a recording console and a multisource, made by Applied Research Laboratories, Glendale, Calif., allows duplicate analysis on a single sample of these constituents to be made in a total time of 3 to 4 minutes.

Variety of rolled and cast samples repeatedly provided standard deviations from 0.3 to 0.4 per cent of the quantity measured. Thus for an 18 per cent chromium determination, represents an error of 0.07 per cent, for an 8 per cent nickel determination an error of 0.03 per cent.

Electrodes for Merchant Ships

TYPE R arc welding electrodes bearing AWS classification No. E6010, direct current reverse polarity, may now be specified for Coast Guard-inspected work, according to Metal & Thermit Corp., New York. Accepted by the Merchant Marine Technical Division of U. S. Coast Guard, the electrode has a tensile strength of 63 to 75,000 psi, a yield point of 54 to 61,000 psi and a 22 to 31 per cent elongation in 2 inches. Electrode meets requirements of ASTM designation A233-48T.

Plastic Housing Is Water-Tight

TIME needed to splice power and signal cables is reduced by a plastic cable splice housing which gives a durable water-tight electrical seal. Developed by United States Rubber Co., New York, the housing is said to eliminate outside wrapping operations which splicers use to join lengths of electrical cable. Use may be for aerial or underground installations on either rubber or Neoprene cable.

Structural part of the housing is a pipe made from a tough corrosion-proof blend of synthetic rubber and thermoplastic resins. The pipe fits over the cable joint and two rubber seals are used to make a water-tight seal. Threaded plastic caps on each end of the pipe grip the cable and insure a finished joint.

Repeated blows from a heavy hammer are reported to be withstood by the housing without shattering or cracking. Moisture absorption is extremely low and its electrical insulating values are high. Other characteristics include resistance to acids, oils and alkalies.

Coating Withstands Elements

ALL metals and plated surfaces may be protected against rust, corrosion, pitting and tarnish by a newly developed coating which is tough, transparent and colorless. Withstanding weather, heat, cold, grease, grit, etc., the coating, made by Temperature Equipment Corp. of Cleveland, may be removed with standard acetates.

Formula is clear and is said to add sheen to metal and plated or baked finish. It may be used in the m tenance of aluminum, brass or br trim in store fronts, staircases, vators, etc. Application may b brushing, spraying or dipping. reaches maximum hardness in 8 hours and will withstand a bend.

Load Tap Changer Improved

SMOOTH acceleration and decel tion with high speed from one position to another and positive al ment at each position is achieve the new URS load tap char offered by Westinghouse Ele Corp., Pittsburgh. These funct are performed by means of ge gears which permit direct con tion between contacts and dri motor.

Changer is standard equipmen type URS step-type feeder vol regulators with ratings of 750 three-phase and up to 69 kv in age. It also can be applied to p transformers of 15,000 kva and low, unit substations and CSP er transformers. Unit is enclose a steel tank as a single, self- tained unit which is bolted b flange to the apparatus with w it is used.

How To Control Complaints

"WATCH Your Customer C plaints," a publication available New York University College of gineering, New York, describes every company should insure its r tation in the field by the pr handling of customer compla Text covers five points in a s plan to control complaints: Ho advertising, planned organizatio complaint reports; factual me of assigning the fault responsib to people who can correct the er a straight-forward report of plaint progress to top manage and a study of the comparative of on-the-spot settlement.

Steel Founding Team Report

REPORT of the 1949 visit to country of a productivity team re senting the British Steel Foun Industry is contained in a report lished by Anglo-American Counc Productivity, London. Informatio given on the purpose and progra the productivity team and phases of steel foundry condit and techniques as labor, working ditions, equipment, production m ods and control, quality, rese management and administration. drawings, tables and photographs incorporated in the 108-page pub tion.

rrosion Protection

(*Continued from Page* 85)

s ascribed by the authors to re-very from internal stress.

olybdenum and Molybdenum Alloy ating—Experiments were reported L. F. Yntema, Fansteel Metal-rgical Corp., which showed that tallic molybdenum can be electro-posited from aqueous solutions of olybdic acid containing high concen-ation of salts. The report, based work conducted at St. Louis Uni-rsity in conjunction with Sister M. Ksycki, cited formates, acetates, opionates, fluorides, and phosphates sodium, potassium, and ammonium being satisfactory for use. The timum pH range for operation of e baths, as measured with a glass ctrode, was stated to be 5.5 to 6.8. rrent density range given was be-ween 0.06 and 3.3 amp per sq cm., hile the temperature could be varied tween 30-50° C. Deposits were ob-ined on copper, nickel and iron thodes, using platinum or carbon anode materials.

Deposits were characterized by ex-llent adherence to the base metal. hysical appearance of deposits of proximately 0.001 mm thickness is at of a smooth white metal with high luster; thicker deposits have duller appearance, particularly ound the edges of the cathode here the current density is higher. was pointed out that of all the fac-rs involved in the deposition of olybdenum, the mole ratio of anion water appears to be the most im-rtant. Limiting ratios for the ectrolytes were given as follows: $_2O$/formate equals 1.6 to 2.0; H_2O/etate equals 1.8 to 3.5; H_2O/fluo-de equals 3.6 to 6.6; H_2O/propionate uals 1.6.

Deposition of Metals on Aluminum—A new process for depositing zinc, dmium and tin on aluminum by emical displacement was described Samuel Heiman, Philadelphia ustproof Co., based on research con-cted at the University of Pennsyl-nia. Immersion solutions recom-ended contain the metal sulphate d either hydrofluoric acid or the uoride anion. The immersion de-sits were reported to have good ppearance, sound structure and ex-llent adhesion to the aluminum, hich does not depend upon any oughening of the aluminum surface. he immersion deposits were stated be satisfactory for use as a base r plated coatings; quality of plated roduct was described as equal to at produced using the alkaline ncate dip, which is generally con-dered to be the best commercial method now in use for plating on aluminum.

Metal Potential Measurements—A technique for measuring the solution potential of a metal or alloy on a micro scale, based on work conducted at the Cornell Aeronautical Laboratory was described before the corrosion symposium of the meeting by L. W. Smith of Cornell Aeronautical and V. J. Pingel, Fansteel Metallurgical Corp. The technique consists of electrically insulating with a transparent plastic film the polished and etched surface of the metal specimen mounted in Lucite or Bakelite, puncturing the film at the desired location with aid of a specially adapted Tukon hardness tester and then determining the solution potential at

HEATLESS PROCESS

May Change Welding Practice

NEW process of welding without electricity or any applied heat is soon to be made available to American industry. The method, reported to actually flow metals together by pressure to form one continuous piece, is expected to revolutionize both industrial and job welding, according to William Dubilier, founder and technical director of Cornell-Dubilier Electric Corp.

Developed in England at the laboratories of General Electric Co. Ltd (not associated with GE of this country) the process already is being considered in welding operations of the aviation industry. American rights for the development, Mr. Dubilier states, are now in the hands of a group of business men forming the Koldweld Corp. in New York.

Process is so simple that no special skill is needed on part of the worker, equipment is inexpensive and can be carried in a man's pocket. It can be used with metals of any thickness, from very thin foil of less than 0.001-inch thick to the heaviest metals. The method is said to be well suited for vacuum or moisture proofing, due to the elimination of blowholes caused by expansion and contraction of gases.

No Oxide on Surface—At present, the most important application of the process is for the cold welding of aluminum, it is reported. Aluminum surfaces to be welded must be entirely free from the film of oxide which begins to form immediately after the aluminum is exposed to the atmosphere. Once removed by a simple method, the film reforms comparatively slowly, making possible satisfactory welds several hours later, providing interim contamination by moisture or grease has not taken place.

Metal is made to flow away from the welding point as the tools are brought together. Experimentation has shown that the rate of application of the pressure does not appear to affect the strength of the weld; good welds can be made with tools giving either a slow squeeze or a rapid impact. Shape of the tool, however, is most important.

There has been little evidence of die wear in runs carried out with suitable die materials. In many applications it is said to be possible to counteract effects of such wear by occasionally resetting the die closure.

Three Techniques—In the application of the cold welding process, three different techniques have been developed—the straight weld, the ring weld and the continuous seam weld. Straight weld may be used for box seams, for sealing tube ends and for other forms of lapped joints which are almost equivalent to butt welds. The ring weld is used for sealing the end of a flanged tube, for joining a flanged tube to a plate for making hose connections, or two disks may be joined together to form an air pressure cell. Wheels may also be constructed by taking advantage of the natural flow of the material to form the shape.

Important applications of the seam weld are for tube making and for sheathed cables. Already in operation is a machine in which the process of scratch-brushing, final forming, welding and trimming are carried out continuously and automatically. In addition, a roller welding machine can be used to seal the edges of a folded section while following a complicated outline. Free edges of a box-shaped section may also be seamed by rolling in such a machine.

the point of puncture. In this manner, it is possible to examine an alloy of normal grain size with aid of the Tukon microscope (566X) and obtain the solution potential of any desired part of the microstructure. Results with a number of aluminum-base alloys were reported before the symposium.

The experimenters pointed out that solution potential measurements have long been a means of predicting the corrosion susceptibility of groups of metals or alloys when exposed to various corrosion mediums. It is possible in this way to determine the feasibility of using two different metals in close contact under conditions where electrolytic action may take place. However, when a single alloy is to be used, the corrosion susceptibility cannot be predicted by solution potential measurements of the entire mass. It then becomes necessary to determine the solution potential of the various microconstituents and grain areas of the alloy. The micropotential method was applied to a study sponsored by the Bureau of Aeronautics on stabilization of 24S type aluminum alloys against intergranular corrosion by element additions.

Specific Problem — The specific potential measuring problem involved is illustrated in Fig. 6 showing a copper-aluminum alloy structure (4.5 Cu, balance aluminum) that has resulted from air cooling from a solution temperature of 910° F. The grain boundaries have been copper depleted, thus having a more electronegative potential than the adjacent areas. In the presence of an electrolyte this grain boundary portion is anodic to the grain boundary precipitate and the solid solution grain interior. The photomicrograph in Fig. 6 shows the effect of salt-peroxide type corrosive electrolyte on such a grain structure showing that the attack is intergranular proceeding along the depleted grain boundary areas.

In the procedure described for making the micropotential measuremen the metal specimen is first mount in Lucite or Bakelite and th polished and etched in the conve tional manner. A thin transpare film of plastic coating is then appli with an eye dropper and allowed dry. The transparent plastic co ing being used at the Cornell Ae nautical Laboratory is ethyl cellulc dissolved on various solvents whi control the drying time to appro mately 5 minutes. After electrical i sulation has been verified, the spe men is ready for microscopic obser tion at magnifications up to 56 and the selection of the desired ar for solution potential measurement.

It was pointed out that tests ha been conducted on weld specime and standard aluminum alloys wi satisfactory results. With further i provements in the transparent co ing and with an improved cutti and smaller indenter, it should possible to use this method for termining microsolution potent values not only for aluminum allo but also for stainless steels and oth metallurgical corrosion problems.

Surface Roughness of Metals— another paper before the corrosi symposium, Thomas P. May, Intern tional Nickel Co., described work c ried out in conjunction with Robe L. Burrell Jr., Northwestern Unive sity on the gas adsorption method f determining the roughness of met surfaces. From the adsorption is therms for ethylene at —186° C, t quantity of gas required to form monomolecular film was determine With this figure and an estimate the area covered by a single gas m lecule, the true submicroscopic ar of the solid surface is calculated.

By extending measurements of t adsorption isotherms to the satur tion pressure, the quantity of gas r quired to fill the pores of porous su faces is determined and an estima can be made of the average pore si and number of pores per unit are provided one knows the depth of t pores. Results of applying the met od to aluminum surfaces before a after surface treatments are report in Table II. Results are given terms of a unit called the roughne factor, which is the simple ratio the measured surface area divid by the apparent geometrical area the specimens used.

Many of these results were check by adsorption measurements wi nitrogen at 193° C. They may be error by 10-20 per cent but co parative roughness measuremen should be correct within 5 per ce The porous structure of the anod film formed on aluminum in sulphu

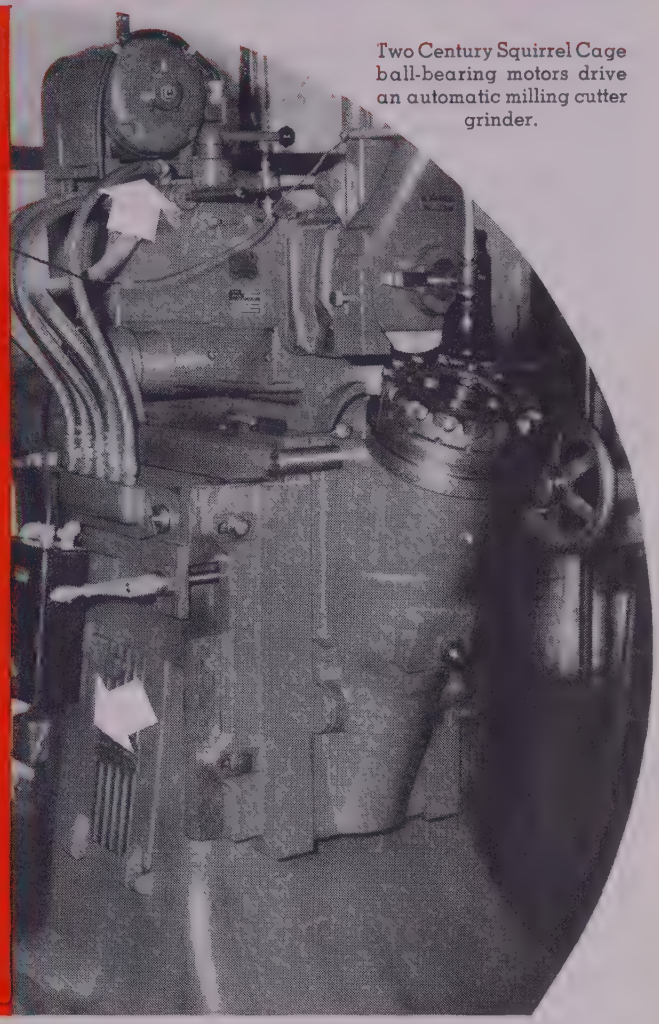
SCALE GIVEN BRUSH-OFF: Cost of preparing surfaces of products for painting is being reduced through the use of power brushing for removal of weld and heat scale at Caterpillar Tractor Co., Peoria, Ill. By using disk-center wire wheel brushes and wire cup brushes made by Osborn Mfg. Co., Cleveland, the portable air tools so equipped are able to provide the clean surface necessary for a long lasting paint finish

esigned to Protect the Accuracy of your Equipment—

Century

MOTORS

Help Maintain ool Room Precision on Production Jobs



Two Century Squirrel Cage ball-bearing motors drive an automatic milling cutter grinder.

Popular types and standard ratings are generally available from factory and branch office stocks.

Century motors are designed, produced and tested to give you all the precision your machine was designed to provide.

Century motors' unusual freedom from vibration contributes to closer tolerances, smoother operation and fewer rejects. These motors are precision built to close tolerances—ruggedly designed to maintain alignment—and are carefully balanced, electrically and mechanically.

Century motors are built in a wide range of types and kinds, in sizes from 1/6 to 400 horsepower—for operation on single phase, three phase and direct current.

Specify Century motors for all your electric power requirements.

Century C MOTORS

CENTURY ELECTRIC COMPANY

1806 Pine Street, St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

-630

acid permitted an estimate of the average pore size and the number of pores per unit area. An aluminum surface anodized 30 minutes in 15 per cent sulphuric acid develops an oxide film with approximately 1.55 x 10 pores per square centimeter having an average diameter of 107 Angstrom units. A knowledge of true surface areas and pore structure should be of considerable interest and value in the study of electrodeposited coatings and in the study of reaction rates at solid surfaces.

Management Association Papers

FIRST of two new publications of American Management Association, New York is personnel series No. 124, "The Practical Meaning of Management Statesmanship." Included are four papers, "Competition for Leadership in a Welfare Economy" by Thomas G. Spates, vice president of General Foods Corp.; "Challenge of World Trends to American Management Statesmanship," by Stefan Osusky of Colgate University; "Positive Management Action in Human Relations" by James DeCamp Wise, president, Bigelow-Sanford Carpet Co. Inc.; and "Top Management Views the Job Ahead in Industrial Relations" by James J. Nance, president, Hotpoint Inc.

General management series No. 144 includes papers on "Operating Under Decentralized Management" and "New Goals in Economic and Labor Policies." Included are papers on "Positive Management — Dynamic Motivation of Human Resources" by J. Carlton Bagnall of Swank Inc.; "Policies and Principles of Decentralized Management" by Edwin T. Gibson, executive vice president, General Foods Corp.; and "Economic Base for Management Policy." Latter paper is divided into two parts, International Economic Policy by Richard Glenn Gettell, assistant to publisher, *Fortune;* and Domestic Economic Policy, by C. D. Jackson, publisher, *Fortune.*

Aircraft Power Bibliography

BOOKS and published reports on gas turbines, jet propulsion and rocket power plants are included in a bibliography published by National Bureau of Standards and available from U. S. Government Printing Office, Washington 25, D.C. In addition to information on the various types of propulsion units, sections are devoted to combustion and combustion chambers, aerodynamics, metallurgy, machining and welding and ceramic materials in gas turbines. It is identified as circular 482.

LETTERS *to the Editors...*

More on Boron

We are collecting data on the use of boron as an addition to steel and would appreciate receiving tear sheets of the following articles: "An Evaluation of Boron-Treated Steels," Dec. 8, 1947, p. 93; "Colorimetric Determination of Boron in Steel Using Quinalizarin Reaction," April 5, 1943, p. 114; "Boron Assumes a Position of Importance as an Alloying Element in Steel," Oct. 18, 1943, p. 106.

I. Jacobson
Purchasing Department
Belgameric Inc.
New York, N. Y.

Requested material being sent. Further information is available from National Bureau of Standards, Washington 25, D. C.—The Editors

Can't Operate Without It

If available, I would appreciate tear sheets of the article, "Operation of Statistical Quality Control in a Steel Mill," which appeared in the March 14, 1949, issue of STEEL. The magazine has been misplaced in our plant and, as this department is interested in statistical quality control, this information would be quite helpful at this time.

Walter B. Levy
Metallurgical Department
National Supply Co.
Torrance, Calif.

Address Furnished

Would you please supply me with the address of the Metal Powder Association. I am anxious to secure a copy of the proceedings of its Chicago meeting referred to in the Sept. 5 issue of STEEL.

F. D. Fanning
Engineering Department
United States Time Corp.
Little Rock, Ark.

Metal Powder Association is located at 420 Lexington Ave., New York 17, N. Y.—The Editors

Good Vision Returns

In the Nov. 17, 1947 issue of STEEL, there appeared an article titled, "Good Vision Program Increases Efficiency, Improves Employee Morale," by Elmer M. Soles, O. D., which is most interesting. I believe that the article would make a fine feature for vision specialists and laymen to read in the Fall issue of *Visual Digest Magazine,* published by the department of public information of the American Optometric Association in the interest of the visual care of the American public. May we have your permission to reprint.

Ruth Ann Nickel
Visual Digest Magazine
Minneapolis, Minn.

Permission granted.—The Editors

Marform Process Is Popular

On page 100 of the Sept. 26 is of STEEL there was a short arti on sheet metal forming which w referred to as Marform. We wo very much appreciate it if you wo supply us with any additional inf mation that you have and also us know just where full details be obtained.

B. H. Crowell
Oneida Products Corp.
Canastota, N. Y.

Process was developed by engineers of G L. Martin Co., Baltimore, Md., and it is known whether or not it will be licen For more details contact the company's c mercial sales department.—The Editors

Bar Information

In the August 29 issue of ST there is an article on page 66 by Benjamin Melnitsky. The inform tion on the methods of bar identifi tion at the Glenn L. Martin Co. terests us very much. We won if we could obtain more detailed formation on this operation.

It is possible that this automa system and the linen stencil equ ment was built for Martin by a fi specializing in this work, in wh case we should like to be put in tou with them, as they would be able give us complete details regardi cost and operating.

Arthur G. Lambert
Vice President and Manager
Export Division
Atlas Steels Ltd.
Welland, Canada

Article referred to was, "How To Iden Engineering Materials." We have forwar the inquiry to Mr. Melnitsky, who is one our contributors.—The Editors

Like That Section

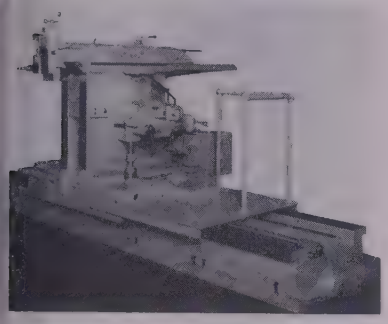
Please let me congratulate you the new feature of STEEL's Mark Section—it will indeed be somethi the industry has been wishing and you certainly are handing something that even Santa Cla couldn't pull out of his bag. STEEL our Bible around here and while are only sort of a hole in the w we nevertheless need STEEL as guiding light.

E. R. Standfuss
General Manager
Shunk Mfg. Co.
Bucyrus, O.

ırge Area Shaper

Parts requiring shaping over a rge area of travel may be prossed by the new traveling shaper veloped by Cincinnati Shaper Co., opple, Garrard and Elam Sts., Cinnnati, O. Employing the method of avel of a boring mill, it is capable shaping a surface requiring up to feet of table travel without retting the work piece. Longer table avel could be obtained by lengthening the ways.

Shaper is built with a 36-inch ram roke and has either hand or power

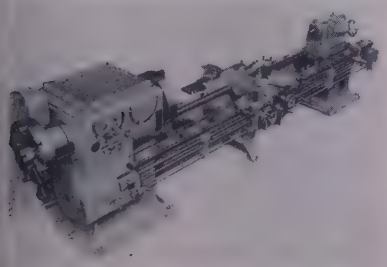


ed and built-in power rapid tarse. One of two automatic oiling stems is for the shaper ram, feed d drive mechanism, while the other for the saddle and ways on which e shaper rides. A full length scale the center guide bearing with ver-er, vernier light and magnifying ass makes possible accurate ttings. Ram speeds are available om 8 to 102 strokes per minute. ool slide has 9-inch vertical adjustent and power feed.

heck No. 1 on Reply Card for more Details

athe with Hollow Spindle

Rated as a 20-inch size, a new ollow spindle lathe with 9-inch bore, ade by R. K. LeBlond Machine ool Co., Cincinnati 8, O., will swing



7 inches over bed and carriage ings. It is offered with center disances starting at 48 inches, has an 8-speed geared headstock and is arranged for 20-hp main drive motor.

Eighteen spindle speeds range from 18 to 362 rpm. An electric brake with apron spindle control starts, stops and reverses the spindle. Totally enclosed automatically lubricated quick change feed box offers 63 feed and thread changes.

Check No. 2 on Reply Card for more Details

Makes Rapid Reproduction

Anything drawn, typed, printed or written may be reproduced at variable speeds up to 24 fpm on the model 50 Whiteprinter, made by Charles Bruning Co. Inc., 4754 W. Montrose Ave., Chicago 41, Ill. It is designed to fit requirements of users needing a machine capable of producing up to 10,000 sq ft of prints during the working day. Prints are delivered flat and dry, ready for instant use.

Machine requires no plumbing connections or ventilation ducts, and it may be located anywhere the necessary current can be provided. Prints ranging from postcard size to 42 inches wide and any length may be produced. Choice of sensitized paper, film and cloth in the form of cut sheets and roll stock are offered.

Check No. 3 on Reply Card for more Details

Lathe Features Heavy Spindle

Broad feed and speed ranges for all types of work, convenience in operation, and lubrication facilities to minimize wear and maintenance are incorporated in the design of model S lathe, manufactured by Springfield Machine Tool Co., Springfield, O. The 16-inch lathe has a heavy spindle with 24 speeds mounted on three heavy duty bearings. Hardened and ground gears provide a speed range of 15 to 100 rpm, with higher or lower ranges available.

An automatic pump provides lubrication for all bearings and gears in the head. A combination of quadrant gearing and 60-feed and thread gear box provides a quick change over from standard operations to metric, module and diametral pitch setups. All standard threads are included. Power rapid traverse and main drive motors are mounted in the cabinet lathe. Chip and coolant pan is independent of machine, resting on ball casters for easy rolling out for cleaning or positioning at operator's convenience. Coolant pump is mounted on rear of pan and has quick-disconnect hose and electrical couplings.

Check No. 4 on Reply Card for more Details

Press Shearing Die Attachment

Use as a combination punch press and power squaring shear is possible with the installation of a shearing die attachment on model 3048 Multi-Max punch presses, made by Diamond Machine Tool Co., 3429 E. Olympic Blvd., Los Angeles 23, Calif. Attachment converts press into a 10-gage, 48-inch power squaring shear in about 15 minutes.

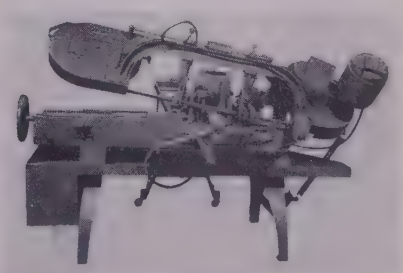
Adjustable front and back gages are standard equipment. Hold downs are of one-piece construction, stripper type spring-loaded. Slope per foot of blade is ⅜-inch.

Check No. 5 on Reply Card for more Details

Feeds Bars Into Band Saws

Horizontal metal cutting band saws may be converted into fully automatic cutoff machines by an automatic bar stock feeder announced by Wells Mfg. Corp., 1515 Fillmore St., Three Rivers, Mich. Named the Wells-O-Bar Feed Master, it attaches easily and without interference to normal saw operations. An air actuated spiral roller drive, plus air control of saw frame during each cutting and resetting cycle, makes the multiple cutting action automatic.

Maximum length of multiple cuts



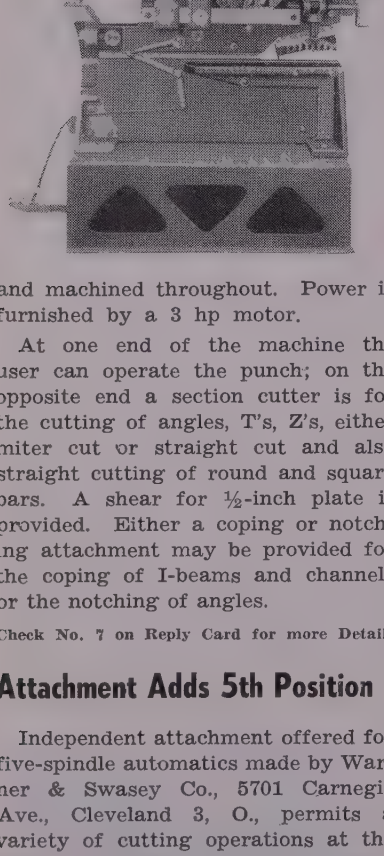
is 18 inches. Cuts can be made to within 5 inches of the end of the stock and a safety device trips on

the last piece to shut off the feeder. Roller table track's height is adjustable from 24 to 30 inches and requires a floor space of 20 x 72 inches.

Check No. 6 on Reply Card for more Details

Combined Punch, Shear, Coper

For use in structural and maintenance shops and other plants regularly having punching and shearing work is the Steelworker, a combination punch, shear and coper built by Webb Corp., Webb City, Mo. Unit is of unisteel construction with steel plate accurately fitted together



and machined throughout. Power is furnished by a 3 hp motor.

At one end of the machine the user can operate the punch; on the opposite end a section cutter is for the cutting of angles, T's, Z's, either miter cut or straight cut and also straight cutting of round and square bars. A shear for ½-inch plate is provided. Either a coping or notching attachment may be provided for the coping of I-beams and channels or the notching of angles.

Check No. 7 on Reply Card for more Details

Attachment Adds 5th Position

Independent attachment offered for five-spindle automatics made by Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, O., permits a variety of cutting operations at the fifth longitudinal station, normally inactive during cutoff. Provision is made for drilling, reaming, facing, chamfering, counterboring, burring and threading in the cutoff position. Attachment consists of a cam-operated actuating lever driving a stroke arm linked to a tool holder which is mounted on a slide affixed to the main tool slide.

This arrangement permits a variable stroke tool with accelerated tool retraction to operate during cutoff, retracting before the finished piece actually drops. Device has an infinitely adjustable feed stroke in a $\frac{3}{16}$ to $3\frac{3}{4}$-inch range within a total strike of $3\frac{1}{16}$ to $8\frac{1}{4}$ inches.

Check No. 8 on Reply Card for more Details

Pumps Automatic Reversing

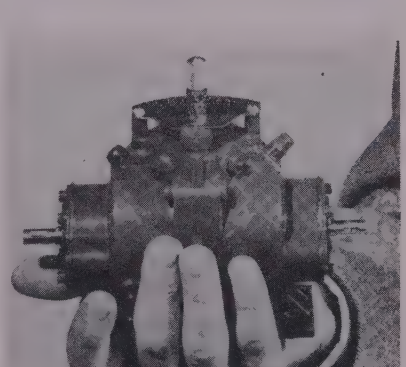
Designed for continuous operation against pressures up to 100 pounds is a line of automatic reversing pumps of the vane type, offered by Brown & Sharpe Mfg. Co., Providence 1, R. I. Capacities in gallons per minute at 0 pounds pressure are, for the No. 8021, from 0.6 to 2.5; No. 8061, from 1.4 to 5.4; and No. 8101, from 2.9 to 11.5.

Similar capacities are available in stripped models with housings or stripped models without housings. Designs meet demand of original equipment manufacturers for built-in or integral pumps.

Check No. 9 on Reply Card for more Details

Small Vari-Speed Transmission

For use in instruments, recorders, timers and light conveyors is the midget model 10 variable speed transmission developed by Graham Transmissions Inc., 3754 N. Holton St., Milwaukee 12, Wis. It is offered with lever type of control which may be connected through suitable linkage to automatic control devices of various types — mechanical, hydraulic, electric, pneumatic, etc. It is also furnished with a micrometer



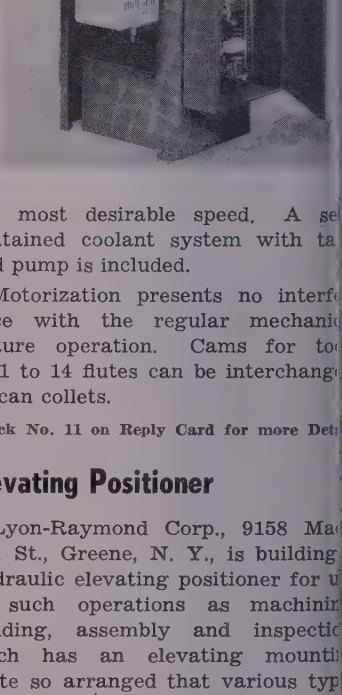
type of control for extremely fine adjustment from top speed to zero.

Without reduction, when driven at 2700 rpm, the transmission delivers speeds from 1800 rpm to 0; at 1800 rpm input it gives speeds from 1200 rpm to 0 with a torque of 50 inch-ounces. Built-in reduction gearboxes with ratios from 5:1 to 1000:1 are available, making a complete packaged unit requiring only four mounting screws with a delivered torque to 250 inch-pounds. Sealed bearings permit mounting in any position

Check No. 10 on Reply Card for more De

Radial Relief Grinder

Stepless speed control through to 150 rpm is provided by a Gene Electric Thymotrol unit at the t of a dial on the D-S radial re tool grinder offered by Royal C Tool & Machine Co., 621 E. 4th Royal Oak, Mich. This control p mits finish grinding to take place



the most desirable speed. A se contained coolant system with ta and pump is included.

Motorization presents no interfe ence with the regular mechani fixture operation. Cams for to of 1 to 14 flutes can be interchang as can collets.

Check No. 11 on Reply Card for more Det

Elevating Positioner

Lyon-Raymond Corp., 9158 Ma son St., Greene, N. Y., is building hydraulic elevating positioner for u in such operations as machinin welding, assembly and inspectio Each has an elevating mounti plate so arranged that various typ of fixtures can be installed. Cap city of the positioner is 1000 poun

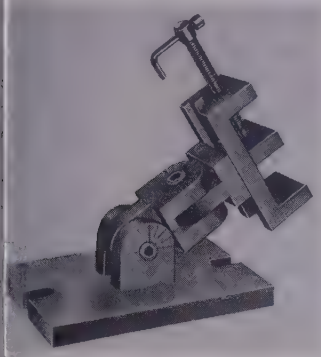
Typical of the fixtures which m be used are an adjustable revolvi arm, an Aronson universal balanc positioning arm, a standard pla form, adjustable forks. Operati may be by hand or foot pump, ele tric power or air-operated pump.

Check No. 12 on Reply Card for more Det

Compound Angle Vise

Milling of all shapes, holes drill in unusual locations with accura finishing of any surface to size grinding and the forming and shar

g of tool bits and from and dado ers are operations within the n of a compound angle vise an- ced by En Fab Inc., 338 Par- St., Kalamazoo, Mich. These



ations may be accomplished by g the compound swivels to ob- the position required.

vivel vise may be converted to aight drill vise by removing four h cap screws. It will hold ma- l up to 1½ x 2½ inches. Slotted size is 4 x 6 inches and over- eight is 6 inches. Unit swings degrees in either direction and asily adjusted by socket head ws.

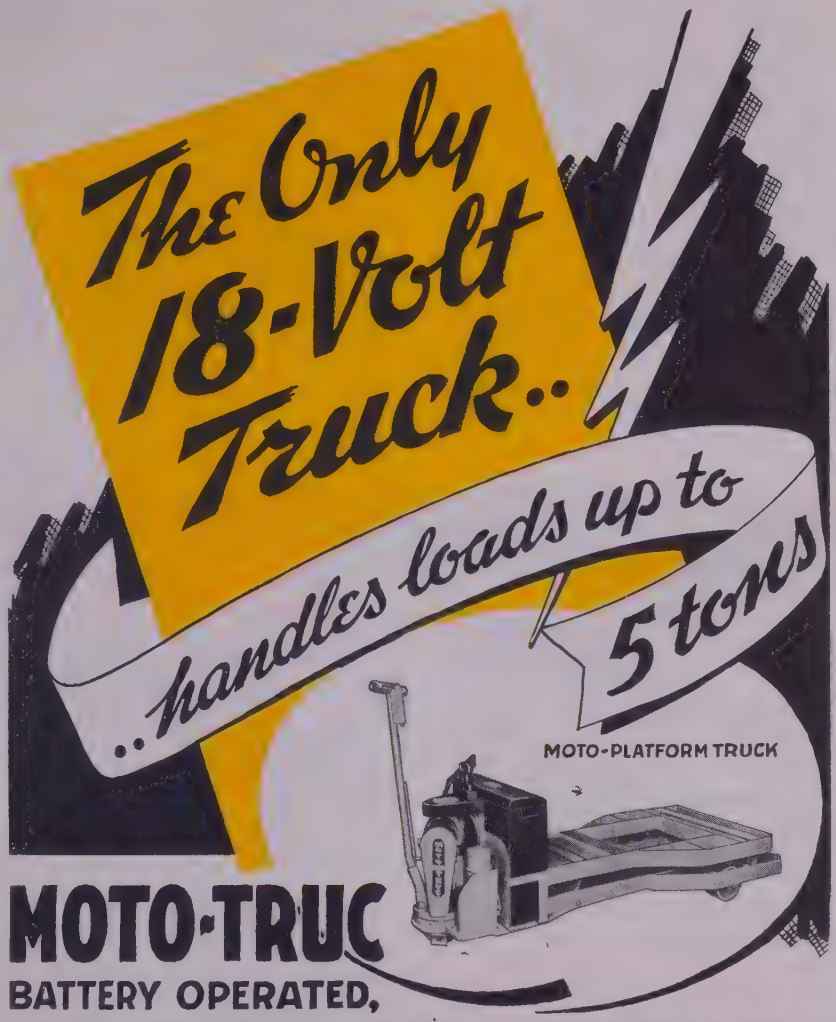
No. 13 on Reply Card for more Details

cks Flatness to Millionths

atness accuracy may be checked ss than one light band (0.0000116-) by the Lapmaster optical flats monochromatic lights developed Crane Packing Co., 1800 Cuyler , Chicago, Ill. Developed to k the accuracy of lapped parts, monochromatic light is equally tive for checking light band flat- of any superfinished surface. t source and checking stage are

lf-contained unit which is ad- ble from the stage type to a h type by rotating the head 180 es.

tical flats are of natural quartz,



MOTO-TRUC
BATTERY OPERATED, MOTORIZED WALKIE TYPE TRUCKS

This new and more powerful 18-volt truck is built to specifications for width and length of load, and contains the exclusive features that have made Moto-Trucs the choice of materials handling engineers.

SHORTER OVERALL LENGTH, due to compact motor unit. Operates in narrower aisles.

SIMPLEST AND EASIEST CONTROL. Easy grip roller type handle gives two speeds forward and two speeds reverse by a turn of the wrist. Push buttons in the ends of handle control the hydraulic lifting and lowering.

MOTO-TRUCS ARE SAFE. Low line of battery mounting prevents top-heaviness and tipping. This feature, plus dead man controls, offers real protection for both operator and loads.

MOTO-TRUCS USE AMAZINGLY LITTLE BATTERY POWER and are ruggedly built for long service and low maintenance cost.

WRITE FOR LITERATURE

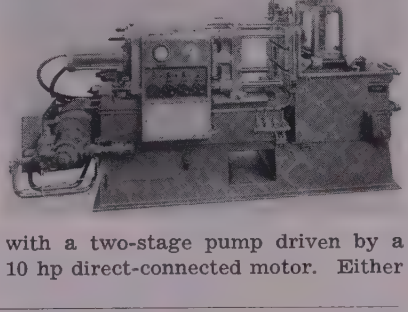
The MOTO-TRUC Co.
1953 E. 59th Street
CLEVELAND 3, OHIO.
ORIGINATORS OF MOTORIZED HAND TRUCKS

are highly transparent and will withstand wear, abrasion and thermal shock. Flats of 1/10 light band accuracy and 1/5 light band accuracy are standard. Sizes range to 6-inch diameters.

Check No. 14 on Reply Card for more Details

Rapid Die Casting Machine

Available either as a cold chamber machine for casting aluminum or as a gooseneck type for casting zinc, tin or lead is the model 50 die casting machine announced by Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, O. A high pressure hydraulic machine, it is equipped



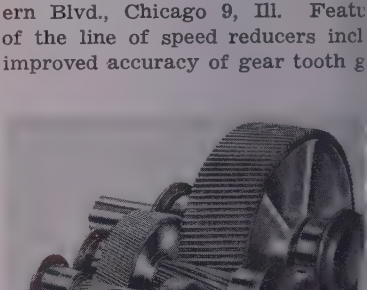
with a two-stage pump driven by a 10 hp direct-connected motor. Either automatic or manual control may supplied.

Die plates measure 18 x 22 inc and four tie bars are 2 inches diameter. Space between tie bar 12 x 16 inches and the die open is 8 inches. Machine can prod aluminum castings up to 2½ pou and zinc castings to 4 pounds. F cycle time is over 100 shots per ho actual production rate of any cast is dependent upon the complexity size of the casting itself.

Check No. 15 on Reply Card for more De

Enclosed Helical Gear Drives

Single, double and triple reduct units are available in the line Maxi-Power enclosed helical g drives available from Foote B Gear & Machine Corp., 4545 S. W ern Blvd., Chicago 9, Ill. Featu of the line of speed reducers incl improved accuracy of gear tooth g



eration, closer manufacturing to ances and reinforced housing des

Improvements permit selection a smaller size and lower weight than previously possible. M Power drives are available in 42 s with standard ratios ranging f 2.08 to 1 through 360 to 1. Capaci range up to 1550 hp.

Check No. 16 on Reply Card for more De

Small-Lot Deburring Barrels

Small lots of stampings, die casti and similar pieces may be rap and conveniently deburred by a iable speed barrel announced by B Mfg. Co., 943 N. Cicero Ave., Chic 51, Ill. Unit may also be used test runs to determine correct tating speed, the kind and size media or abrasive, the best load and other factors essential to ficient finishing.

Barrel may be mounted on a be or small stand. It is rotated by enclosed variable speed drive w

PRECISION:

You want a precision-made press—one that does a precision job. You can count on R. D. Wood hydraulic presses for both! The 1000-ton molding press shown is an example. Used for molding a variety of products, and just one of an extensive R. D. Wood line, it proves in operation that precision means less maintenance cost, greater operating efficiency, and a consistently better job.

QUOTAS:

You want a press that can stand up to modern plant production quotas. R. D. Wood presses are built to meet these demands. Rigid, rugged and reliable, they're *specifically designed* to meet strict production schedules. Write for literature today on hydraulic presses, or *any* hydraulic press problem. R. D. WOOD COMPANY, Public Ledger Building, Independence Square, Philadelphia 5, Pa.

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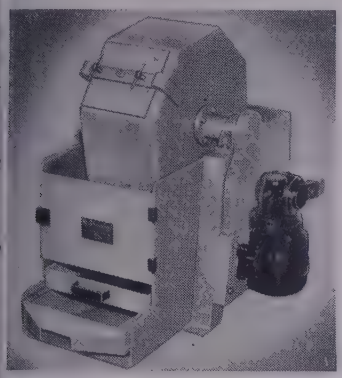
mits adjustment to any speed be-
een 13 and 39 rpm. Two sliding
ys, the top one of which is per-



ated, afford separation of the
rk from the media. Barrels are
ered in 0.4 and 2.0 cubic feet ca-
city.

ck No. 17 on Reply Card for more Details

• • •

R HOT AND HEAVY WORK: 6S electrode holder, developed Martin Wells Inc., Los Angeles 1, if., handles ⅜-inch rods at 600 to amp on full duty cycle welding l is light in weight and cool in ration.

ck No. 18 on Reply Card for more Details

TALLURGICAL PRODUCTS: stern Sealant Inc., Culver City, if., offers two new products. Flaw-ster is a thermosetting compound d to reclaim metal parts and cast-s that have been rejected. Bond-agent R-313 is a medium for nually bonding dissimilar and ilar materials such as glass, plas-, Neoprene, etc., to metals and rous to nonferrous metals, etc.

ck No. 19 on Reply Card for more Details

ODUCES STEADY SUPPLY OF R: Known as Thag, the heated generators introduced by Todd pyards Corp., Elmhurst, Long and, N. Y., are capable of produc-a steady supply of air with tem-atures up to 600° F at 1000 cfm. ecial units are available which can duce 40,000 cfm at 950° F and psi. Units can be used for an-ling, enameling, hardening, bak- and porcelainizing.

ck No. 20 on Reply Card for more Details

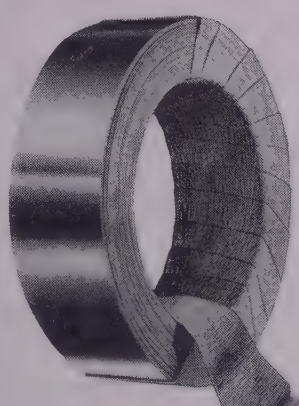
VES CONTROL OF TEMPERA-RE: Niagara Blower Co., New rk 17, N. Y., offers a controlled nidity method, a new system of conditioning giving complete con-l of temperature and relative

"Gad, Plunkett... How it Draws!"

No question about it! Production-wise, *pre-coated* Thomas Strip is fast and accurate on the draw. And, it DRAWS SALES and PROFITS, as well, through its substantial contribution to lower production and operating costs, and to higher and more consistent product quality.

★ ★ ★

Take ZINC COATED Thomas Strip, for example. Its steel base—processed for maximum workability in your process and on your equipment—can be made to flow freely in the deepest draws. Its generous zinc coating does not crack, chip or peel, and gives drawn parts a uniform coating of proper thickness *both inside and out.* The tight zinc coating protects parts against rust and corrosion, and is widely used as the final product finish. It may be furnished chemically-treated as a protective base for paint and lacquer.



In short, *pre-coated* Thomas Strip eliminates several fussy processing stages...much of the preparation, cleaning, plating, buffing...and streamlines your process to two essentials—fast fabrication and assembly. It can draw sales and profits for you. Write for samples and for metallurgical assistance—without obligation.

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WARREN, OHIO
Specialists in Cold Rolled Strip Steel

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Electrocoated with Chromium, Nickel, Copper, Zinc and Brass • Hot Dipped Tin and Lead Alloy • Lacquer Coated in Colors • Annealed and Tempered Spring Steel • Alloy Strip Steel • Uncoated Strip Steel • Produced to Your Specifications.

Thomas Strip
SPEEDS PRODUCTION...CUTS COSTS

humidity, holding constant conditioning or varying them at will of the use. It provides dry air at normal atmospheric temperatures with little or no refrigeration.

Check No. 21 on Reply Card for more Details

COMBINES FUNCTIONS: Improved and redesigned models of drafters announced by Charles Bruning Co. Inc., Chicago 41, Ill., combine functions of T-square, straightedge, triangles, protractors and scales in one unit. Models introduce Equipoise mechanism, a device that counteracts effect of gravity when draftsman is working on a tilted drawing board.

Check No. 22 on Reply Card for more Details

ASSURES TIGHT SEAL: Stanwood Corp., Chicago 39, Ill., offers a furnace retort featuring one-piece bottom seal ring that will hold its shape throughout life of retort, assuring a tight seal and easy installation or removal from furnace. Available in standard sizes.

Check No. 23 on Reply Card for more Details

DIRECTS COMPRESSED AIR: Model NFS, a foot-operated air cylinder control valve, offered by Hannifin Corp., Chicago 24, Ill., is a reciprocating, packless, disk type valve. Piston operated and pilot controlled, it is designed to direct compressed air alternately to two pressure ports for operation of a double-acting air cylinder. Available in ½ and ¾-inch sizes.

Check No. 24 on Reply Card for more Details

SELF-TAPPING SCREWS: A self-tapping socket head cap screw offered by Parker-Kalon Corp., New York 14, N. Y., is a combination of the size-marked socket head common to company's standard cap screw and thread body of its regular type F self-tapping screw which cuts a thread in a plain drilled hole in metal or plastics.

Check No. 25 on Reply Card for more Details

CONTROLS TEMPERATURE: Pyrovisor, a new radiation pyrometer developed by Bristol Co., Waterbury 20, Conn., is designed for indicating, recording or controlling temperatures up to 4000° F in furnaces and kilns. Unit is mounted on outside of furnace or kilns away from the hot zone and picks up radiant energy emitted from surface of object under measurement.

Check No. 26 on Reply Card for more Details

POSITIONS BUNDLES AUTOMATICALLY: A package feeding mechanism for standard wire and tying machines has been developed by Curtis Development & Mfg. Co., Milwaukee, Wis. It positions bundles automatically for the desired number of ties by the tying machine and will regulate both conveyor traffic and tying operations.

Check No. 27 on Reply Card for more Details

POWER UNITS FOR SHOPS: Two new power units have been developed by Stow Mfg. Co., Binghamton, N. Y. Jiffy tool is a floor model, delivering ¼-hp at 1750 rpm through a 5-foot flexible shaft. Motor operates on 110 v, 60 cycle, single phase ac. Speed Jiffy has three speed variation, 1000, 1750 and 3000 rpm and features an automatic tensioning belt

Check No. 28 on Reply Card for more Details

POWERS ELECTRICALLY-ACTIVATED DEVICES: A new line of gear head motors, developed by Robbins & Myers Inc., Springfield, O., features a complete range of countershaft speeds for powering of all types of electrically-activated devices. Available for single and double reduction requirements in ratings from 1/200 to 1/3 hp.

Check No. 29 on Reply Card for more Details

PROVIDES POSITIVE SEAL: Designated as Thread-Tite, a sealing compound in stick form is offered by Armite Laboratories, Los Angeles 1, Calif. Applying it to any pipe threads before joints are made up provides a positive seal against gases, brine, acids, water, etc., at high and low pressures and temperatures.

Check No. 30 on Reply Card for more Details

EASY TO MANEUVER: Atlas Industrial Corp., Brooklyn 32, N. Y., introduces a new electrically operated extension scaffold with which workmen can reach a height up to 26 feet. Roller bearing swivel casters on all four legs make it easy to move about.

Check No. 31 on Reply Card for more Details

PEN WRITES CONTINUOUSLY: Chartomatic pen, designed for continuous use in all recording instrument charts, is announced by Chartomatic Co., Los Angeles 11, Calif. It writes continuously and is replenished from a sealed ink supply that is closed to atmosphere and dirt.

Check No. 32 on Reply Card for more Details

PLASTIC COATINGS IN COLOR: Krylon No. 200 series of protective plastic coatings for industry is offered by Foster & Kester, Philadelphia 32, Pa. Krylon 200 clear, white and machine gray all have impro bonding characteristics to metal are resistant to abrasion. Krylon white is resistant to fading and coloration from sunlight or indust fumes.

Check No. 33 on Reply Card for more De

CUTS WIRE ROPE AND STE ROD: The Guillotine with shear-t cutting blade is a portable hydra hand tool developed by Manco M Co., Bradley, Ill., to cut both w rope up to 1¼ inches and mild s rod up to ¾-inch. It can be adap to perform crimping, swedging bending operations on large diame material.

Check No. 34 on Reply Card for more De

COUNTER FEATURES LARG SIZE FIGURES: Designated as model, a new top-reading rotary m el counter is announced by Dur Mfg. Co., Milwaukee, Wis. Both set and non-reset models are stoc in four-figure cases; five and six ure sizes are available. Figures large for clear legibility.

Check No. 35 on Reply Card for more De

CHEMICAL-RESISTING PAI Known as Ucilon 1701, a chemical sisting general maintenance paint use on metals, wood, brick and c crete is offered by United Chromi Inc., New York 17, N. Y. It can applied over old paint or other s faces without priming, sandblast or other surface treatment.

Check No. 36 on Reply Card for more De

CARBIDE TIPPED BLADE: A n carbide tipped expansion type rou ing blade for boring bars is int duced by Super Tool Co., Detroit Mich. It is expanded by loosen the set screw.

Check No. 37 on Reply Card for more De

CUTS TAPER THREADS: Style insert chaser die head, made by Ea ern Machine Screw Corp., New H ven 6, Conn., cuts taper pipe threa Construction of the die head is s that chasers gradually open as ta thread is being cut, tapering act being controlled by a positive cam the die head. This action elimina marks along the thread.

Check No. 38 on Reply Card for more De

FOR MORE INFORMATIO
on the new products and equipme in this section, fill in a car It will receive prompt attentio

Helpful Literature

Machine Bases & Frames

an Dorn Iron Works—16-page il-rated booklet entitled "Fabri-d Machine Supporting Units" dis-ses welded steel machine bases frames as means of reducing ght and increasing flexibility of hine design. Company's facilities design and manufacture of steel es and supporting structures are lined.

Continuous Ridge Ventilator

urt Mfg. Co.—6-page illustrated lication "Burt Monovent Continu-Ridge Ventilator" discusses de-n and construction of continuous e ventilators available in six s from 4 to 24 in. and supplied in ndard 10-ft sections and special tions of shorter length.

Air Valves

Bellows Co.—10-page illustrated letin AV100 gives details of stand-air valves for remote control of gle and double-acting air cylin-s. Valves are button, lever, cam, vis, treadle or foot operated. Two, ee and four-way valves are avail-e in ¼, ⅜, ½, ¾ and 1-in. port ses.

Steel Plant Car

Magor Car Corp.—6-page illus-ted booklet "The Answer to High fuse Disposal Costs" describes air-mp car for handling open hearth skullcracker refuse, pit scrap, e dust, furnace rebuild refuse, nulated slag, ore, limestone and er materials. It can be dumped on her side by one operator in about seconds.

Hydraulic Presses

American Steel Foundries, Elmes gineering Div. — 12-page bulletin . 1010-B covers hydraulic metal-rking presses. Electric control vides semi-automatic operation, tomatic operation, and inching with eed change and reversal of slide verned either by ram travel or essure.

Wire Rope

Jones & Laughlin Steel Corp.—Il-strated pocket-sized handbook titled Wire Rope is a Machine" gives ex-nation of how wire rope works, w it should be operated and how to ect and order correct wire rope nstruction for long service life. In-uded are tables of weights and engths, standard fittings, slings d splicing service.

Custom-Cut Gears

Perkins Machine & Gear Co.—4-ge illustrated folder on custom-cut etallic or nonmetallic gears pre-nts typical applications that include shing and ironing machines, air-aft engines and accessories, ma-ine tools, precision instruments, al stokers, hoists and pumps.

82. Universal Electric Tools

Independent Pneumatic Tool Co.—Catalog No. E-2 gives complete data, including prices, on line of universal electric portable power tools. Also available is circular No. JE-1131 presenting details of new Thor Silver Line 4½-in. electric belt sander.

83. Submerged Melt Welding

Linde Air Products Co.—36-page illustrated booklet "Unionmelt Apparatus Catalog" contains latest information on apparatus and supplies for submerged melt welding. Sections deal with portable DS welding head, shape welding carriage and flexible welder. There is also section on rebuilding of worn surfaces.

84. Metal Degreasing

Chlorine Products Div., E. I. du Pont de Nemours & Co.—12-page illustrated booket "Metal Degreasing with Chlorinated Solvents" deals with standard practices established through consultation with manufacturers of metal degreasing equipment. Outlined are fundamentals of machine design, installation and operation which must be considered to insure safety and efficiency when using nonflammable solvents.

85. Cables & Cable Sizes

Construction Materials Dept., General Electric Co.—12-page publication entitled "Selection of Proper Cable Size" deals with method of determining types and sizes of asbestos-varnished cambric cables. Detailed instruction is given on figuring load current, voltage drop, cables and cable sizes for both lighting and motor loads.

86. Code Symbol Stamps

M. E. Cunningham Co.—6-page illustrated folder describes standard code symbol stamps for identifying inspectors, operations, workmen and dates as well as specially designed stamps for indicating acceptance, rejection, deviation and other inspection markings.

87. Industrial Lift Truck

Hyster Co. — 16-page illustrated form 1016F describes Hyster's 4000-lb industrial lift truck mounted on pneumatic tires. Gas powered unit can be used to hoist and transport materials indoors and outdoors and is built around unit power package that combines engine, clutch, transmission, differential and brakes in compact, easily serviced component.

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88. Sensitive Radial Drill

Fosdick Machine Tool Co.—16-page illustrated catalog No. 40 presents data on sensitive radial drill available with or without tilting table, automatic tapping reverse, auxiliary feed lever and power elevation to table. Supplied in 3 or 4-ft models, machine operates at spindle speeds from 60 to 3500 rpm.

89. Radiant-Tube Heating

Holcraft & Co.—8-page illustrated bulletin is entitled "Radiant-Tube Heating of Controlled-Atmosphere Heat Treat Furnaces." Publication illustrates flame characteristics required in fuel-fired tubes, defines burner performance features essential to efficient operation and describes quick-change combination burner that permits either gas or oil firing. Electrically-heated radiant tubes are covered also.

90. Automatic Presses

E. W. Bliss Co.—22-page catalog No. 27-B deals with series 600 high production presses which are designed to produce large quantities of stampings requiring comparatively short strokes. Capacities ranging from 8 to 300 tons are available, and publication lists construction features and specifications of each model.

91. Calcium Carbide

National Carbide Corp.—16-page illustrated booklet entitled "The Miracle of Calcium Carbide" traces history of calcium carbide from its discovery through developments of manufacture and current usage. Reviewed are its uses as illuminating gas, fuel gas for welding and cutting metals, and as important raw material in manufacture of plastics and synthetic rubbers.

92. Electric Typewriter

International Business Machines Corp.—6-page illustrated form No. 55-5582-0 portrays IBM Executive electric typewriter which features uniform impression, adjustable platen for multiple copies and automatic word expander. Having four-position ribbon control, machine is available with any of four type faces, with characters individually spaced according to width.

93. Malleable Castings

Maumee Malleable Castings Co.—8-page illustrated bulletin "The Place for Dependable Malleable Castings" describes facilities for volume production of malleable castings of any size up to 200 lb. Annealing processes and equipment are discussed and typical products depicted.

94. Water Conditioning

Graver Water Conditioning Co.—page illustrated bulletin No. WC-1 outlines products, services and bac ground of company's water conditio ing processes and equipment. Inst lations listed include hot-process a zeolite softeners, demineralizers, cl ifiers and filters.

95. Electric Furnace

Hevi Duty Electric Co.—4-page lustrated bulletin LAB-1049 conta information on type 0771-A air dr muffle furnace for rapid and unifo heating of metals and other materi at temperatures to 1250° F. Hous in cylindrical steel shell, furna utilizes pyramidal type base, 48-st tap changing transformer, removal assembly and replaceable heati units.

96. High Speed Steel

Universal-Cyclops Steel Corp.—page illustrated manual contains formation on Unicut intermediate m lybdenum-tungsten high speed st with high carbon and vanadium co tent. Chemical analysis, heat tre ment and range of applications detailed; and hardening and temp ing curve is included.

97. Carbide Dies

Lincoln Park Industries, Inc.—page illustrated brochure "Carbi Dies Increase Production, Redu Costs, Improve Quality" presents separate case studies of results tained from use of carbide dies. Pu lication illustrates typical dies a parts produced and describes d making facilities.

98. Case Hardening Products

Denfis Chemical Laboratories, I —6-page illustrated folder "An E tirely New Approach to Case Harde ing" explains application of Carbu rapid pack hardening paste and I pac isolating paste to keep desir sections soft while rest of work being hardened by any conventio process.

99. Low Carbon Stainless Ste

Peter A. Frasse Co.—5-page illu trated "Frasse Engineering Mem randum" No. 5 deals with resistan to sensitization of stainless steels co taining maximum of 0.03-per ce carbon. Results of nitric-hydrofluo acid etch test on metal-arc weld specimens in as-welded condition a tabulated and illustrated.

100. Pyrometer Indicators

Thermo Electric Co.—4-page illu trated instrument section No. 25 de with multiple point pyrometer in cators designed for general industr temperature measuring applicatio Compact assembly of pyrometer a connector panel provides rapid mea for indicating temperatures from o to six thermocouple locations.

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13	33	53	73	93
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18	38	58	78	98
19	39	59	79	99
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Market Summary

STEEL shortages threaten the next four to five months. But overall scarcity will not be comparable with that of 1948 and early 1949. Importance of ingot conversion deals is overemphasized in appraisals of the supply outlook. Except for sheets, strip, certain wire products, and pipe, major product supply holds promise of quickly catching up with swollen inventory requirements. Some producers are expected to be current with demand for some products by yearend. Cancellations of duplicated tonnage will ease the mill burden, while slower current buying prompts the view mid-first-quarter will find the market fairly normal.

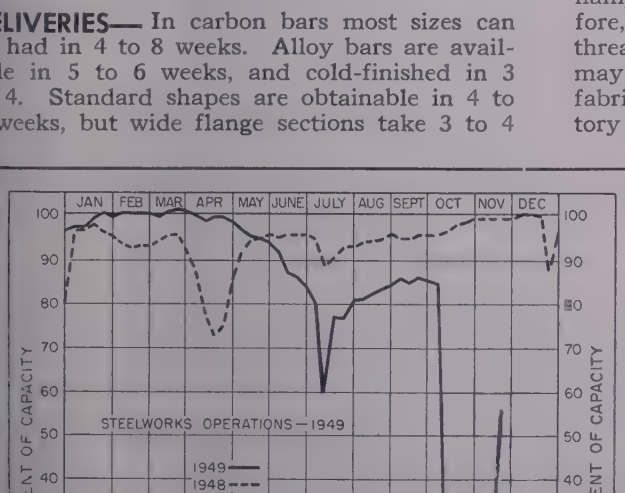
PRODUCTION—Resumption of steelmaking at additional units caused a 32 point jump in the national ingot rate to 56 per cent of capacity. Operations may top 80 per cent by this weekend. Only a few steelmakers remain to be signed by the union. Prestrike finishing mill operations will not be attained until some time in December. Production emphasis is on galvanized and cold-rolled sheets, tin plate, carbon bars, pipe and wide flange beams.

SUPPLY— Consumers are replenishing inventories, specifying actively against orders on mill books. But the edge is off demand. Only light flat-rolled products are under highly sustained pressure. Pipe trade is brisk but less strong than recently. Producers will not enter 1950 with unusually heavy order arrearages, except in sheets and pipe. Delivery promises vary among mills and products, and some rationing will be necessary well into the new year. Shipments of most products, however, will not be as extended as had been thought.

DELIVERIES— In carbon bars most sizes can be had in 4 to 8 weeks. Alloy bars are available in 5 to 6 weeks, and cold-finished in 3 to 4. Standard shapes are obtainable in 4 to 5 weeks, but wide flange sections take 3 to 4 months. No extended deliveries are indicated in plates and tonnage is available in 3 to 4 weeks. Some wire items may be tight through first quarter. Most flat-rolled producers are booked through the first 3 months of 1950; at least one through first half. Order backlogs are extended 4 months on galvanized sheets, 3 months on cold-rolled sheets, tin plate and enameling sheets; 2 months on hot and cold-rolled strip, silicon sheets and strip. Stainless sheets can be had in 5 to 6 weeks.

PRICES—Increases in steel prices are looked for in first quarter. Welfare and pension costs are estimated to add $3 to $4 per ton to steel charges. These are expected to be passed along to consumers, depending upon competitive conditions. Smaller steelmakers are likely to effect advances before yearend. A few interests already have announced raises. Last week, a New England producer of stainless strip increased prices $5 per ton. STEEL's steelmaking scrap composite increased $2 a ton last week to $30. All other sections of the steel market held steady, the weighted index on finished steel standing at 152.52. Arithmetical price composites were unchanged as follows: Finished steel, $91.64; basic pig iron, $45.60; No. 2 foundry, $46.10; malleable pig iron, $47.27.

OUTLOOK—With major steel labor disputes apparently settled for months to come, producers think consumers will not be disposed to lay in extra stocks. In fact, some consumers are reported holding substantial inventories, having curtailed operations as a conservation measure before the strike ended. Many buyers face pension plan problems which may hamper inventory financing. Caution, therefore, is expected in ordering from here on though threat of higher prices, seen in first quarter, may alter this policy. Further curtailment of fabricating operations is seen pending inventory replenishment, but the worst is over.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Nov. 19	Change	Same Week 1948	Same Week 1947
Pittsburgh	43	+41	97.5	100
Chicago	43	+37	98	94.5
Eastern Pa.	79.5	+14.5	95	93.5
Youngstown	50	+45	105	91
Wheeling	78	+18	92.5	93.5
Cleveland	66	+52	99	90.5
Buffalo	101	+16*	104	88.5
Birmingham	25	+19	100	103
New England	73	+15	90	87
Cincinnati	56	+ 4	99	87
St. Louis	91.5	None	84.5	78
Detroit	79	+38	99	92
Western	58	+28.5	..	..
Estimated national rate	56	+32	99	96.5

Based on weekly steelmaking capacity of 1,843,516 net tons for 1949; 1,802,476 net tons for 1948; 1,749,928 tons for 1947. *Change from revised rate.

Composite Market Averages

	Nov. 17 1949	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)	152.52	152.52	152.52	151.86	99.16
Index in cents per lb ..	4.132	4.132	4.132	4.114	2.686
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$91.64	$91.64	$91.64	$95.05	$56.73
No. 2 Fdry Pig Iron, GT	46.10	46.10	46.10	46.69	23.67
Malleable Pig Iron, GT..	47.27	47.27	47.27	47.41	24.29
Basic Pig Iron, GT.....	45.60	45.60	45.60	46.29	23.00
Steelmaking Scrap, GT..	30.00	28.00	26.17	43.25	16.50

Weighted finished steel index based on average shipments and prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Nov. 17 1949	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh ...	3.35	3.35	3.35	3.35–55	2.15
Bars, H.R., del. Phila. ...	3.83	3.83	3.83	3.79	2.47
Bars, H.R., Chicago	3.35	3.35	3.35	3.35	2.15
Bars, C. F., Pittsburgh	3.95-4.00	3.95-4.00	3.95-4.00	3.95-4.25	2.65
Bars, C.F., Chicago	4.00	4.00	4.00	4.00	2.65
Shapes, Std., Pittsburgh ..	3.25	3.25	3.25	3.25–30	2.10
Shapes, Std., Chicago	3.25	3.25	3.25	3.25	2.10
Shapes, del. Phila.	3.50	3.50	3.50	3.48	2.215
Plates, Pittsburgh	3.40	3.40	3.40	3.40–60	2.10
Plates, Chicago	3.40	3.40	3.40	3.40	2.10
Plates, Coatesville, Pa. ..	3.50	3.50	3.50	3.75	2.10
Plates, Sparrows Point, Md.	3.40	3.40	3.40	3.45	2.10
Plates, Claymont, Del.	3.50	3.50	3.50	3.95	2.10
Plates, del. Phila.	3.59	3.59	3.59	3.71	2.15
Sheets, H.R., Pittsburgh ..	3.25	3.25	3.25	3.25–30	2.10
Sheets, H.R., Chicago	3.25	3.25	3.25	3.25	2.10
Sheets, C.R., Pittsburgh ..	4.00	4.00	4.00	4.00	3.05
Sheets, C.R., Chicago	4.00	4.00	4.00	4.00	3.05
Sheets, C.R., Detroit	4.20	4.20	4.20	4.20	3.15
Sheets, Galv., Pittsburgh ..	4.40	4.40	4.40	4.40	3.50
Strip, H.R., Pittsburgh ...	3.25	3.25	3.25	3.25–70	2.10
Strip, H.R., Chicago	3.25	3.25	3.25	3.25–30	2.10
Strip, C.R., Pittsburgh ...	4.00	4.00	4.00	4.00–75	2.80
Strip, C.R., Chicago	4.00–15	4.00–15	4.00–15	4.00–25	2.90
Strip, C.R., Detroit	4.20–25	4.20–25	4.20–25	4.20–50	2.90
Wire, Basic, Pittsburgh ...	4.15	4.15	4.15	4.15-4.50	2.60
Nails, Wire, Pittsburgh ...	5.15	5.15	5.15	5.15-6.30	2.55
Tin plate, box, Pittsburgh.	$7.75	$7.75	$7.75	$6.70	$5.00

SEMIFINISHED

Billets, forging, Pitts.(NT)	$61.00	$61.00	$61.00	$61.00	$40.00
Sheet bar, mill(NT)	51.78–52.00	51.78–52.00	51.78–52.00	67.00	34.00
Wire rods, 7/32-⅜", Pitts. ..	3.40	3.40	3.40	3.40-4.15	2.00

PIG IRON, Gross Ton

Bessemer, Pitts.	$47.00	$47.00	$47.00	$47.00	$24.50
Basic, Valley	46.00	46.00	46.00	46.00	23.50
Basic, del. Phila.	49.44	49.44	49.44	50.17	25.34
No. 2 Fdry, Pitts.	46.50	46.50	46.50	46.50	24.00
No. 2 Fdry, Chicago	46.50	46.50	46.50	46.00-46.50	24.00
No. 2 Fdry, Valley	46.50	46.50	46.50	46.50	24.00
No. 2 Fdry, del. Phila. ...	49.94	49.94	49.94	50.67	25.84
No. 2 Fdry, Birmingham..	39.38	39.38	39.38	43.38	20.38
No. 2 Fdry.(Birm.)del Cin.	46.08	46.08	46.08	49.09	24.06
Malleable, Valley	46.50	46.50	46.50	46.50	24.00
Malleable, Chicago	46.50	46.50	46.50	46.50	24.00
Charcoal, Lyles, Tenn.	60.00	60.00	60.00	66.00	33.00
Ferromanganese, Etna, Pa.	175.00	175.00	175.00	163.00	135.00*

* Delivered, duty paid.

SCRAP, Gross Ton

No. 1 Heavy Melt. Pitts. ..	$33.00	$29.50	$29.00	$42.75	$17.50
No. 1 Heavy Melt. E. Pa. .	26.50	25.00	24.00	45.25	15.50
No. 1 Heavy Melt. Chicago.	30.50	29.50	25.50	41.75	16.50
No. 1 Heavy Melt. Valley..	32.75	32.75	31.25	42.75	16.25
No. 1 Heavy Melt. Cleve...	30.25	30.25	26.50	42.25	15.25
No. 1 Heavy Melt. Buffalo.	29.75	28.25	27.25	48.50	17.00
Rails, Rerolling, Chicago..	39.50	39.50	41.50	70.50	22.25
No. 1 Cast, Chicago.....	42.50	42.50	41.50	70.50	20.00

COKE, Gross Ton

Beehive, Furn., Connlsvl. .	$13.25	$13.25	$13.25	$14.50	$7.00
Beehive, Fdry., Connlsvl. .	15.75	15.75	15.75	17.00	7.75
Oven Fdry, Chicago.....	20.00	20.00	20.00	20.40	13.35

NONFERROUS METALS

Copper, del. Conn.	18.50	18.50	17.625	23.50	12.00
Zinc, E. St. Louis	9.75	9.75-10.00	9.25	17.50	8.25
Lead, St. Louis	12.55	12.60	12.80	21.30–35	6.35
Tin, New York	92.50	94.50	95.75	103.00	52.00
Aluminum, del.	17.00	17.00	17.00	17.00	15.00
Antimony, Laredo, Tex. ..	32.00	32.00	38.50	38.50	14.50
Nickel, refinery, duty paid	40.00	40.00	40.00	40.00	35.00

Pig Iron

For key to producing companies, turn next page.
Minimum delivered prices do not include 3% federal tax.

PIG IRON, Gross Ton	Basic	No. 2 Foundry	Malle-able	Bes-me
Bethlehem,Pa. B2	$48.00	$48.50	$49.00	$49.
Newark,del.	50.63	51.13	51.63	52.
Brooklyn,N.Y.,del.	....	52.79	53.29	..
Birmingham District				
Birmingham,Ala. R2, S9	38.88	39.38	....	..
Woodward,Ala. W15	38.88	39.38	....	..
Cincinnati,del.	....	46.08	....	..
Buffalo District				
Buffalo H1, R2	46.00	46.50	47.00	..
Tonawanda,N.Y. W12	46.00	46.50	47.00	..
N.Tonawanda,N.Y. T9	....	46.50	47.00	..
Boston, del.	55.26	55.76	56.20	..
Rochester,N.Y.,del.	48.63	49.13	49.63	..
Syracuse,N.Y.,del.	49.58	50.08	50.58	..
Chicago District				
Chicago I-3	46.00	46.50	46.50	47.
Gary,Ind. C3	46.00	....	46.50	..
IndianaHarbor,Ind. I-2	46.00	....	46.50	..
So.Chicago,Ill. W14	46.00	46.50	46.50	..
So.Chicago,Ill. C3	46.00	....	46.50	47.
So.Chicago,Ill. Y1	46.00	46.50	46.50	..
Milwaukee,del.	47.89	48.39	48.39	48.
Muskegon,Mich.del.	....	51.98	51.98	..
Cleveland District				
Cleveland A7	46.00	46.50	46.50	47.
Cleveland R2	46.00	46.50	46.50	..
Akron, del. from Cleve.	48.39	48.89	48.89	49.
Lorain,O. N3	46.00	....	....	47.
Duluth I-3	....	....	46.50	..
Erie,Pa. I-3	46.00	46.50	46.50	47.
Everett,Mass. E1	....	50.50	51.00	..
Geneva,Utah G1	46.00	46.50	....	..
Seattle,Tacoma,Wash.,del.	....	54.20	....	..
Portland,Oreg., del.	....	54.20	....	..
LosAngeles,SanFrancisco,del. ...	53.70	54.20	....	..
GraniteCity,Ill. M10	47.90	48.40	48.90	..
St.Louis,del.(incl. tax)	48.65	49.15	49.65	..
Ironton,Utah C11	46.00	46.50	....	..
Minnequa,Colo. C10	47.00	47.50	47.50	..
Pittsburgh District				
NevilleIsland,Pa. P6	46.00	46.50	46.50	47.
Pitts.N.&S. sides,Ambridge, Aliquippa,del.	47.19	47.69	47.69	47.
McKeesRocks,del.	46.95	47.45	47.45	47.
Lawrenceville,Homestead, McKeesport,Monaca,del.	47.44	47.94	47.94	48.
Verona,del.	47.90	48.40	48.40	48.
Brackenridge,del.	48.13	48.63	48.63	49.
Bessemer,Pa. C3	46.00	....	46.50	47.
Clairton,Rankin,So.Duquesne,Pa. C3	46.00	....	....	..
McKeesport,Pa. N3	46.00	....	....	47.
Sharpsville,Pa. S6	46.00	46.50	46.50	47.
Steelton,Pa. B2	48.00	48.50	49.00	49.
Steubenville,O. W10	46.00	....	....	..
Struthers,O. S16	46.00	....	....	..
Swedeland,Pa. A3	48.00	48.50	49.00	49.
Philadelphia,del.	49.44	49.94	50.44	50.
Toledo,O. I-3	46.00	46.50	46.50	47.
Cincinnati,del.	51.01	51.51	....	..
Troy,N.Y. R2	48.00	48.50	49.00	..
Youngstown District				
Hubbard,O. Y1	46.00	46.50	46.50	..
Youngstown C3	46.00	....	....	47.
Youngstown Y1	46.00	46.50	46.50	47.
Mansfield,O.,del.	50.26	50.76	50.76	51.

* Low phos, Southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 2.25%.
Phosphorous: Deduct 38 cents per ton for P content of 0.70% and
Manganese: Add 50 cents per ton for each 0.50% manganese over or portion thereof.
Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; Add $1 for each 0.5% Si to 11.50%

Jackson,O. J1, G2	$50
Buffalo H1	60

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $ each 0.5% Mn over 1%; $1 for 0.045% max. P)

NiagaraFalls,N.Y. P15	$71
Keokuk,Iowa, Openhearth & Fdry, frt. allowed K2.....	77
Keokuk,Iowa, OH & Fdry, 12½ lb, piglets, frt. allowed K2..	82
Wenatchee,Wash. OH & Fdry, frt. allowed K2	77

CHARCOAL PIG IRON, Gross Ton

(Low phos, semi-cold blast; differential charged for silicon ov base grade; also for hard chilling iron Nos. 5 & 6)

Lyles,Tenn. T3	$60

LOW PHOSPHOROUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$51
Steelton,Pa. B2	54
Philadelphia delivered	57
Troy,N.Y. R2	54

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Semifinished and Finished Steel Products

Mill prices as reported to STEEL Nov. 17, 1949; cents per pound unless otherwise noted. Changes shown in italics.
Code numbers following mill points indicate producing company; key on next two pages.

...TS, Carbon, Forging (NT)

...roit R7 .....$50.00
...hall,Pa. C3 .....50.00

...TS, Alloy (NT)

...roit R7 .....$51.00
...ton,Tex. S5 .....59.00
...land,Pa. C18 .....51.00
...hall,Pa. C3 .....51.00
...quesne,Pa. C3 ...51.00

...TS, BLOOMS & SLABS Carbon, Rerolling (NT)

...emer,Pa. C3 ....$52.00
...ton,Pa. C3 .....52.00
...hocken,Pa. A3 ..57.00
...ey,Ala. T2 .....52.00
...ield,Ala. T2 .....52.00
...ana,Calif. K1 ....71.00
...,Ind. C3 .....52.00
...stown,Pa. B2 ....52.00
...awanna,N.Y. B2 ..52.00
...hall,Pa. C3 .....52.00
...on,Pa. S3 .....52.00
...chicago,Ill. C3 ....52.00
...quesne,Pa. C3 ...52.00

Carbon, Forging (NT)

...emer,Pa. C3 ....$61.00
...alo R2 .....61.00
...on,O. R2 .....61.00
...ton,Pa. C3 .....61.00
...eland R2 .....61.00
...hocken,Pa. A3 ..63.00
...oit R7 .....61.00
...ey,Ala. T2 .....61.00
...ield,Ala. T2 .....61.00
...ana,Calif. K1 ....80.00
...,Ind. C3 .....61.00
...eva,Utah G1 .....61.00
...ston,Tex. S5 .....69.00
...Harbor,Ind. I-2 ....61.00
...stown,Pa. B2 ....61.00
...awanna,N.Y. B2 ..61.00
...hall,Pa. C3 .....61.00
...quesne,Pa. C3 ...61.00
...hicago,Ill. C3, R2..61.00
...ren,O. C17 .....61.00

... Alloy (NT)

...lehem,Pa. B2 ....$63.00
...alo R2 .....63.00
...on,O. R2, T7.....63.00
...hocken,Pa. A3 ..65.00
...oit R7 .....63.00
...ana,Calif. K1 ....82.00
...,Ind. C3 .....63.00
...ton,Tex. S5 .....71.00
...stown,Pa. B2 ....63.00
...awanna,N.Y. B2 ..63.00
...illon,O. R2 .....63.00
...land,Pa. C18 .....63.00
...hall,Pa. C3 .....63.00
...on,Pa. S3 .....63.00
...icago,Ill. C3, R2..63.00
...quesne,Pa. C3 ...63.00
...ren,O. C17 .....63.00

...T BARS (NT)

...ield,O. E6..(GT)$58.00
...smouth,O. P12 ....52.00
...on,Pa. S3 .....52.00

...IDS, SEAMLESS TUBE (NT)

...son,O. R2 .....$76.00
...eland R2 .....76.00
...Harbor,Ind. I-2 ...76.00
...illon,O. R2 .....76.00
...icago,Ill. R2 ....76.00

...K

...ippa,Pa. J5 .....3.25
...hall,Pa. C3 .....3.25
...ren,O. R2 .....3.25
...gstown C3, R2 ....3.25

...L RODS

...amaCity,Ala. R2 ..3.40
...W12 .....3.40
...land A7 .....3.40
...era,Pa. A7 .....3.40
...field,Ala. T2 .....3.40
...ston,Tex. S5 .....3.95
...Harbor,Ind. Y1 ....3.40
...stown,Pa. B2 .....3.40
...go,Ill. A7 .....3.40
...ngeles B3 .....4.20
...ssen,Pa. P7 .....3.40
...burg,Calif. C11 ....4.05
...smouth,O. P12 ....3.40
...icago,Ill. R2 ....3.40
...rowsPoint B2 .....3.50
...ing,Ill. (1) N15 ....3.40
...thers,O. Y1 .....3.40
...ance,Calif. C11 ....4.20
...ester,Mass. A7 ....3.70

STRUCTURALS

Wide Flange

Bethlehem,Pa. B2 .....3.30
Lackawanna,N.Y. B2 ..3.30
Munhall,Pa. C3 .....3.20
So.Chicago,Ill. C3 .....3.20

H.-S. Low-Alloy

Aliquippa,Pa. J5 .....4.95
Bessemer,Ala. T2 .....4.95
Bethlehem,Pa.(14) B2 ..5.05
Clairton,Pa. C3 .....4.95
Fairfield,Ala. T2 .....4.95
Fontana,Calif. K1 .....6.10
Gary,Ind. C3 .....4.95
Ind.Harbor,Ind. I-2, Y1.4.95
Johnstown,Pa. B2 .....5.05
Lackawna,N.Y.(14) B2 .5.05
Munhall,Pa.(14) C3 ....4.95
So.Chicago,Ill.(14) C3 ..4.95
Struthers,O. Y1 .....4.95

Carbon Steel Stand. Shapes

Aliquippa,Pa. J5 .....3.25
Bessemer,Ala. T2 .....3.25
Bethlehem,Pa. B2 .....3.30
Clairton,Pa. C3 .....3.25
Fairfield,Ala. T2 .....3.25
Fontana,Calif. K1 .....3.80
Gary,Ind. C3 .....3.25
Geneva,Utah G1 .....3.25
Houston,Tex. S5 .....3.65
Ind.Harbor,Ind. I-2 ....3.25
Johnstown,Pa. B2 .....3.30
KansasCity,Mo. S5 ....3.85
Lackawanna,N.Y. B2 ..3.30
LosAngeles B3 .....3.85
Minnequa,Colo. C10 ....3.75
Munhall,Pa. C3 .....3.25
Niles,Calif.(22) P1 ....3.97
Portland,Oreg. O4 .....3.90
Seattle B3 .....3.90
So.Chicago,Ill. C3, W14 .3.25
So.SanFrancisco B3 ....3.80
Torrance,Calif. C11 ....3.85
Weirton,W.Va. W6 .....3.25

Alloy Stand. Shapes

Clairton,Pa. C3 .....4.05
Fontana,Calif. K1 .....5.25
Munhall,Pa. C3 .....4.05
So.Chicago,Ill. C3 .....4.05

SHEET STEEL PILING

Ind.Harbor,Ind. I-2 ....4.05
Lackawanna,N.Y. B2 ....4.05
Munhall,Pa. C3 .....4.05
So.Chicago,Ill. C3 .....4.05
Weirton,W.Va. W6 .....4.05

PLATES, Carbon Steel

AlabamaCity,Ala. R2 ..3.40
Aliquippa,Pa. J5 .....3.40
Ashland,Ky.(15) A10 ...3.40
Bessemer,Ala. T2 .....3.40
Clairton,Pa. C3 .....3.40
Claymont,Del. W16 ....3.50
Cleveland J5, R2 .....3.40
Coatesville,Pa. L7 .....3.50
Conshohocken,Pa. A3 ...3.50
Ecorse,Mich. G5 .....3.65
Fairfield,Ala. T2 .....3.40
Fontana,Calif. K1 .....4.00
Gary,Ind. C3 .....3.40
Geneva,Utah G1 .....3.40
Harrisburg,Pa. C5 .....3.75
Houston,Tex. S5 .....3.80
Ind.Harbor,Ind. I-2, Y1.3.40
Johnstown,Pa. B2 .....3.40
Lackawanna,N.Y. B2 ...3.40
Minnequa,Colo. C10 ....4.30
Munhall,Pa. C3 .....3.40
Pittsburgh J5 .....3.40
Seattle B3 .....4.30
Sharon,Pa. S3 .....3.40
So.Chicago,Ill. C3, W14 .3.40
SparrowsPoint,Md. B2 ..3.40
Steubenville,O. W10 ....3.40
Warren,O. R2 .....3.40
Weirton,W.Va. W6 .....3.40
Youngstown C3, Y1 ....3.40

PLATES (Universal Mill)

Fontana,Calif. K1 .....4.30

PLATES, Open-Hearth Alloy

Coatesville,Pa. L7 .....4.50
Conshohocken,Pa. A3 ..4.40
Fontana,Calif. K1 .....5.40
Gary,Ind. C3 .....4.40
Johnstown,Pa. B2 .....4.40
Munhall,Pa. C3 .....4.40
Sharon,Pa. S3 .....4.40
So.Chicago,Ill. C3 .....4.40
SparrowsPoint,Md. B2 ..4.40

PLATES, Ingot Iron

Ashland,cl(15) A10 ....3.65
Ashland,lcl(15) A10 ....4.15
Cleveland,cl R2 .....3.65
Warren,O.,cl R2 .....3.65

PLATES, Wrought Iron

Economy,Pa. B14 .....7.85

PLATES,High-Strength Low-Alloy

Aliquippa,Pa. J5 .....5.20
Bessemer,Ala. T2 .....5.20
Clairton,Pa. C3 .....5.20
Cleveland J5, R2 .....5.20
Conshohocken,Pa. A3 ..5.20
Ecorse,Mich. G5 .....5.45
Fairfield,Ala. T2 .....5.20
Fontana,Calif. K1 .....5.80
Gary,Ind. C3 .....5.20
Geneva,Utah G1 .....5.20
Houston,Tex. S5 .....5.60
Ind.Harbor,Ind. I-2, Y1.5.20
Johnstown,Pa. B2 .....5.20
Munhall,Pa. C3 .....5.20
Pittsburgh J5 .....5.20
Sharon,Pa. S3 .....5.65
So.Chicago,Ill. C3 .....5.20
SparrowsPoint,Md. B2 ..5.20
Warren,O. R2 .....5.20
Youngstown Y1 .....5.20

FLOOR PLATES

Cleveland J5 .....4.55
Conshohocken,Pa. A3 ...4.55
Harrisburg,Pa. C5 .....4.55
Ind.Harbor,Ind. I-2 ....4.55
Munhall,Pa. C3 .....4.55
So.Chicago,Ill. C3 .....4.55

BARS, Hot-Rolled Carbon

AlabamaCity,Ala. R2 ...3.35
Aliquippa,Pa. J5 .....3.35
Alton,Ill.(1) L1 .....3.35
Ashland,Ky. (17) A10 ..3.35
Atlanta,Ga. A11 .....3.50
Bessemer,Ala. T2 .....3.35
Buffalo R2 .....3.35
Canton,O. R2 .....3.35
Clairton,Pa. C3 .....3.35
Cleveland R2 .....3.35
Ecorse,Mich. G5 .....3.55
Emeryville,Calif. J7 ....4.10
Fairfield,Ala. T2 .....3.35
Fontana,Calif. K1 .....4.00
Gary,Ind. C3 .....3.35
Houston,Tex. S5 .....3.75
Ind.Harbor,Ind. I-2, Y1.3.35
Johnstown,Pa. B2 .....3.35
KansasCity,Mo. S5 .....3.95
Lackawanna,N.Y. B2 ...3.35
LosAngeles B3 .....4.05
Marion,O. P11 .....3.35
Midland,Pa. C18 .....3.35
Milton,Pa. B6 .....3.35
Minnequa,Colo. C10 ....3.85
Niles,Calif. P1 .....4.05
N.Tonawanda,N.Y. B11 .3.35
Pittsburg,Calif. C11 ....4.05
Pittsburgh J5 .....3.35
Portland,Oreg. O4 .....4.10
Seattle B3, N14 .....4.10
S.Chicago C3, R2, W14..3.35
So.Duquesne,Pa. C3 ....3.35
S.SanFran.,Cal. B3 ....4.10
Struthers,O. Y1 .....3.35
Torrance,Calif. C11 ....4.05
Weirton,W.Va. W6 .....3.35
Youngstown C3, R2 ....3.35

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5 .....3.35
Atlanta,Ga. A11 .....3.50
Bethlehem,Pa.(2) B2 ...3.55
Johnstown,Pa. B2 .....3.35
Lackawanna,N.Y. B2 ...3.35
Niles,Calif. P1 .....4.05
Pittsburgh(23) J5 .....3.35
Portland,Oreg. O4 .....4.10
SanFrancisco S7 .....4.05
Weirton,W.Va. W6 .....3.35

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2 .....3.75
Buffalo R2 .....3.75
Canton,O. R2, T7 .....3.75
Clairton,Pa. C3 .....3.75
Ecorse,Mich. G5 .....4.05
Fontana,Calif. K1 .....4.75
Gary,Ind. C3 .....3.75
Houston,Tex. S5 .....4.15
Ind.Harbor,Ind. I-2, Y1.3.75
Johnstown,Pa. B2 .....3.75
KansasCity,Mo. S5 .....4.35
Lackawanna,N.Y. B2 ...3.75
LosAngeles B3 .....4.80
Massillon,O. R2 .....3.75
Midland,Pa. C18 .....3.75
S.Chicago C3, R2, W14..3.75
So.Duquesne,Pa. C3 ....3.75
Struthers,O. Y1 .....3.75
Warren,O. C17 .....3.75
Youngstown C3 .....3.75

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. C3 .....4.00
Fontana,Calif. K1 .....4.75
Gary,Ind. C3 .....4.00
Youngstown C3 .....4.00

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy

Aliquippa,Pa. J5 .....5.10
Bessemer,Ala. T2 .....5.10
Bethlehem,Pa. B2 .....5.10
Clairton,Pa. C3 .....5.10
Cleveland R2 .....5.10
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.10
Fontana,Calif. K1 .....6.15
Gary,Ind. C3 .....5.10
Ind.Harbor,Ind. I-2, Y1.5.10
Johnstown,Pa. B2 .....5.10
Lackawanna,N.Y. B2 ...5.10
Pittsburgh J5 .....5.10
So.Duquesne,Pa. C3 ....5.10
Struthers,O. Y1 .....5.10
Youngstown C3 .....5.10

BARS, Cold-Finished Carbon

Aliquippa,Pa. K5 .....4.00
Ambridge,Pa. W18 .....4.00
BeaverFalls,Pa. M12, R2...4.00
Buffalo B5 .....4.00
Camden,N.J. P13 .....4.48
Carnegie,Pa. C12 .....4.00
Chicago W18 .....4.00
Cleveland A7, C20 .....4.00
Cumberland,Md. C19 ...3.95
Donora,Pa. A7 .....4.00
Ecorse,Mich. G5 .....4.30
Elyria,O. W8 .....4.00
FranklinPark,Ill. N5 ....4.00
Gary,Ind. R2 .....4.00
Hammond,Ind. L2, M13.4.00
Hartford,Conn. R2 .....4.40
Harvey,Ill. B5 .....4.00
Indianapolis M13 .....4.20
LosAngeles R2 .....5.40
Mansfield,Mass. B5 ....4.40
Massillon,O. R2, R8....4.00
Midland,Pa. C18 .....4.00
Monaca,Pa. S17 .....4.00
Newark,N.J. W18 .....4.40
Plymouth,Mich. P5 .....4.25
Pittsburgh J5 .....3.95
Putnam,Conn. W18 .....4.40
Readville,Mass. C14 ....4.40
St.Louis,Mo. M5 .....4.35
So.Chicago,Ill. W14 ....4.00
SpringCity,Pa.(5) K3 ..4.48
Struthers,O. Y1 .....4.00
Waukegan,Ill. A7 .....4.00
Youngstown F3, Y1.....4.00

BARS, Cold-Finished Alloy

Aliquippa,Pa. K5 .....4.65
Ambridge,Pa. W18 .....4.65
BeaverFalls,Pa. M12 ...4.65
Bethlehem,Pa. B2 .....4.65
Buffalo B5 .....4.65
Canton,O. R2, T7.....4.65
Carnegie,Pa. C12 .....4.65
Chicago W18 .....4.65
Cleveland A7, C20 .....4.65
Donora,Pa. A7 .....4.65
Elyria,O. W8 .....4.65
Gary,Ind. R2 .....4.65
Hammond,Ind. L2, M13.4.65
Hartford,Conn. R2 .....4.95
Harvey,Ill. B5 .....4.65
Indianapolis M13 .....4.85
Lackawanna,N.Y. B2 ..4.65
Mansfield, Mass. B5...4.95
Massillon,O. R2, R8....4.65
Midland,Pa. C18 .....4.65
Monaca,Pa. S17 .....4.65
Newark,N.J. W18 .....4.95
So.Chicago,Ill. R2, W14.4.65
Struthers,O. Y1 .....4.65
Waukegan,Ill. A7 .....4.65
Worcester,Mass. A7 ....4.95
Youngstown F3, Y1.....4.65

BARS, Reinforcing (Fabricators)

AlabamaCity,Ala. R2 ..3.35
Alton,Ill.(6) L1 .....3.35
Atlanta,Ga. A11 .....3.50
Buffalo R2 .....3.35
Cleveland R2 .....3.35
Emeryville,Calif. J7 ....4.10
Fairfield,Ala. T2 .....3.35
Fontana,Calif. K1 .....4.00
Gary,Ind. C3 .....3.35
Houston,Tex. S5 .....3.75
Ind.Harbor,Ind. I-2, Y1 .3.35
Johnstown,Pa. B2 .....3.35
KansasCity, Mo. S5.....3.95
Lackawanna,N.Y. B2 ..3.35
LosAngeles B3 .....4.05
Minnequa,Colo. C10 ....4.25
Niles,Calif. P1 .....4.05
Pittsburg,Calif. C11 ....4.05
Pittsburgh J5 .....3.35
Portland,Oreg. O4 .....4.10
Seattle, Wash. B3, N14..4.10
So.Chicago,Ill. R2 .....3.35
So.Duquesne,Pa. C3 ....3.35
So.SanFrancisco B3 ....4.10
SparrowsPoint,Md. B2..3.35
Struthers,O. Y1 .....3.35
Torrance,Calif. C11 ....4.05
Youngstown C3, R2 ....3.35

BARS, Reinforcing (Fabricated; to Consumers)

Huntington,W.Va. W7 ..4.50
Johnstown,¼-1" B2 .....4.25
LosAngeles B3 .....5.00
Marion,O. P11 .....4.25
Pittsburgh J5 .....4.25
Seattle B3, N14 .....5.00
So.SanFrancisco B3 ....5.00
SparrowsPt.,1⅛-1¼" B2..4.83
SparrowsPt.,¼-1" B2 ...4.25

RAIL STEEL BARS

ChicagoHts.,Ill.(3) I-2 ..3.25
FortWorth,Tex.(4) T4 ..4.33
Hntngtn,W.Va.(3) W7 ..3.35
Moline,Ill.(3) R2 .....3.35
Williamsport(2,3) S19 ..3.35
Williamsport(4) S19 ....3.85

BARS, Wrought Iron

Economy,Pa.(S.R.)B14..9.50
Economy,Pa.(D.R.)B14.11.00
Economy(Stabit) B14 ..11.30
McK.Rks.(S.R.) L5 ....8.60
McK.Rks.(D.R.) L5 ....11.25
McK.Rks.(Staybolt) L5..12.75

BARS, Hot-Rolled Ingot Iron

Ashland,Ky.(17) A10 ...3.60

SHEETS, Hot-Rolled Steel (18 gage and heavier)

AlabamaCity,Ala. R2 ...3.25
Ashland,Ky.(8) A10 ....3.25
Butler,Pa. A10 .....3.25
Cleveland J5, R2 .....3.25
Conshohocken,Pa. A3 ..3.35
Ecorse,Mich.(8) G5 ....3.45
Fairfield,Ala. T2 .....3.25
Fontana,Calif. K1 .....4.15
Gary,Ind. C3 .....3.25
Ind.Harbor,Ind. I-2, Y1..3.25
Irvin,Pa. C3 .....3.25
Kokomo,Ind. C16 .....3.35
Lackawanna,N.Y. B2 ...3.25
Munhall,Pa. C3 .....3.25
Niles,O. M4 .....3.25
Pittsburg,Calif. C11 ....3.95
Pittsburgh J5 .....3.25
Sharon,Pa. S3 .....3.25
So.Chicago,Ill. W14 ....3.25
SparrowsPoint,Md. B2 ..3.25
Steubenville,O. W10 ....3.25
Torrance,Calif. C11 ....3.95
Warren,O. R2 .....3.25
Weirton,W.Va. W6 .....3.25
Youngstown C3, Y1 ....3.25

SHEETS, Hot-Rolled Carbon Steel (19 gage and lighter)

AlabamaCity,Ala. R2....4.40
Dover,O. R1 .....5.00
Fairfield,Ala. T2 .....4.15
Ind.Harbor,Ind. I-2 ....4.15
Kokomo,Ind. C16 .....4.25
Mansfield,O. E6 .....4.15
Niles,O. N12, M4 .....4.15
Torrance,Calif. C11 ....5.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10 .....4.00
Cleveland J5 R2 .....4.00
Ecorse,Mich. G5 .....4.20
Fairfield,Ala. T2 .....4.00
Follansbee,W.Va. F4 ...4.00
Fontana,Calif. K1 .....4.90
Gary,Ind. C3 .....4.00
GraniteCity,Ill. G4 .....4.20
Ind.Harbor,Ind. I-2, Y1.4.00
Irvin,Pa. C3 .....4.09
Lackawanna,N.Y. B2 ...4.00
Middletown,O. A10 ....4.00
Niles,O. M4 .....4.00
Pittsburg,Calif. C11 ....4.95
Pittsburgh J5 .....4.00
SparrowsPoint,Md. B2...4.00
Steubenville,O. W10 ....4.00
Warren,O. R2 .....4.00
Weirton,W.Va. W6 .....4.00
Youngstown Y1 .....4.00

SHEETS, Cold-Rolled, High-Strength Low-Alloy

Cleveland J5, R2 .....6.05
Ecorse,Mich. G5 .....6.25
Fontana,Calif. K1 .....6.95
Gary,Ind. C3 .....6.05
Ind.Harbor,Ind. I-2, Y1..6.05
Irvin,Pa. C3 .....6.05
Lackawanna,N.Y. B2 ...6.05
Pittsburgh J5 .....6.05
Sharon,Pa. S3 .....6.05
SparrowsPoint,Md. B2...6.05
Warren,O. R2 .....6.05
Weirton,W.Va. W6 .....6.05
Youngstown Y1 .....6.05

SHEETS, H-R (14 ga., heavier) High-Strength Low-Alloy

Cleveland J5, R2	4.95
Conshohocken,Pa. A3	4.95
Ecorse,Mich. G5	5.15
Fairfield,Ala. T2	4.95
Fontana,Calif. K1	6.64
Gary,Ind. C3	4.95
Ind.Harbor,Ind. I-2, Y1	4.95
Irvin,Pa. C3	4.95
Lackawanna,N.Y. B2	4.95
Pittsburgh J5	4.95
Sharon,Pa. S3	4.95
So.Chicago,Ill. C3	4.95
SparrowsPoint,Md. B2	4.95
Warren,O. R2	4.95
Weirton,W.Va. W6	4.95
Youngstown C3, Y1	4.95

SHEETS, Gal'zd No. 10 Steel

AlabamaCity,Ala. R2	4.40
Ashland,Ky.(8) A10	4.40
Canton,O. R2	4.40
Delphos,O. N16	5.40
Dover,O. R1	5.40
Fairfield,Ala. T2	4.40
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Kokomo,Ind. C16	4.50
MartinsFerry,O. W10	4.40
Niles,O. N12	4.40
Pittsburg,Calif. C11	5.15
SparrowsPoint,Md. B2	4.40
Steubenville,O. W10	4.40
Torrance, Calif. C11	5.15
Weirton,W.Va. W6	4.40

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. C3	6.75
SparrowsPoint,Md. B2	6.75

SHEETS, Galvannealed Steel

Canton,O. R2	4.95
Irvin,Pa. C3	4.95
Kokomo,Ind. C16	5.05
Niles,O. N12	4.95

SHEETS, Zincgrip No. 10

Butler,Pa. A10	4.65
Middletown,O. A10	4.65

SHEETS, Electro Galvanized

Cleveland R2	5.15
Niles,O. R2	5.15
Weirton,W.Va. W6	5.00

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.05

SHEETS, Culvert, No. 16 Flat

	Cu Alloy	Cu FE
Ashland A10	5.00	...
Canton,O. R2	5.05	5.50
Fairfield,Ala. T-2	5.00	5.35
Gary C3	5.00	5.35
GraniteCity G4	5.40	5.70
Irvin C3	5.00	5.35
Kokomo C16	5.40	...
MartinsFy,O. W10	5.00	5.35
Pittsburg,Cal. C11	5.75	...
SparrowsPt. B2	5.00	...
Torrance,Cal. C11	5.75	...

SHEETS, Culvert, No. 16 Flat Ingot Iron

Ashland,Ky. A10	5.25

SHEETS, Well Casing

Torrance,Calif. C11	4.75
Youngstown C3	3.75

SHEETS, Aluminized

Butler,Pa. A10	7.75

SHEETS, Long Terne, Steel (No. 10; Commercial Quality)

BeechBotm.,W.Va. W10	4.80
Gary,Ind. C3	4.80
Mansfield,O. E6	4.80
Middletown,O. A10	4.80
Weirton,W.Va. W6	4.80

ROOFING SHORT TERNES (Package; 8 lb coated)

Gary,Ind. C3	$17.50
Yorkville, O. W10	17.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$6.75
Gary,Ind. C3	6.65
Ind.Harbor,Ind. I-2	6.65
Irvin,Pa. C3	6.65
Weirton,W.Va. W6	6.65
Yorkville,O. W10	6.65

SHEETS, Lt. Coated Ternes, 6 lb

Yorkville,O. W10	$7.20

SHEETS, Mfg. Ternes, 8 lb

Gary,Ind. C3	$8.10
Yorkville,O. W10	8.10

SHEETS, Coated Ternes, 12 lb

Gary,Ind. C3	8.95
Yorkville,O. W10	8.95

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.20

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland,Ky.(8) A10	3.50
Cleveland R2	3.85
Ind.Harbor,Ind. I-2	3.50
Warren,O. R2	3.85

SHEETS, Cold-Rolled Ingot Iron

Cleveland R-2	4.60
Middletown,O. A10	4.50
Warren,O. R2	4.60

SHEETS, Galvanized Ingot Iron No. 10 Flat

Ashland,Ky.(8) A10	4.65
Canton,O. R2	5.15
Ind.Harbor,Ind. I-2	4.95

SHEETS, Zincgrip No. 10 Flat, Ingot Iron

Butler,Pa. A10	4.90
Middletown,O. A10	4.90

HOLLOWARE ENAMELING Black Plate (29 gage)

Aliquippa,Pa. J5	5.30
Follansbee,W.Va. F4	5.30
Gary,Ind. C3	5.30
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. C3	5.30
Niles,O. R2	5.30
SparrowsPoint,Md. B2	5.40
Warren,O. R2	5.30
Yorkville,O. W10	5.30

SHEETS, Enam'lg. Iron, No. 12

Ashland,Ky.(8) A10	4.40
Cleveland R2	4.40
Ecorse,Mich. G5	4.70
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Middletown,O. A10	4.40
Niles,O. M4	4.40
Youngstown Y1	4.40

CANMAKING BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$5.75
Fairfield,Ala. T2	5.85
Gary,Ind. C3	5.75
GraniteCity,Ill. G4	5.95
Ind.Harbor,Ind. I-2, Y1	5.75
Irvin,Pa. C3	5.75
Niles,O. R2	5.75
Pittsburg,Calif. C11	6.50
SparrowsPoint,Md. B2	5.85
Warren,O. R2	5.75
Weirton,W.Va. W6	5.75
Yorkville,O. W10	5.75

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$7.50	$7.75
Fairfield,Ala. T2	7.60	7.85
Gary C3	7.50	7.75
Gran.City,Ill G4	7.70	7.95
Ind.Harb. I-2, Y1	7.50	7.75
Irvin,Pa. C3	7.50	7.75
Pitts.,Cal. C11	8.25	8.50
Sp.Pt.,Md. B2	7.60	7.85
Warren R2	7.50	7.75
Weirton W6	7.50	7.75
Yorkville,O. W10.	7.50	7.75

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	3.50
Warren,O. R2	3.85

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	4.60

STRIP, Hot-Rolled Carbon

Alton,Ill.(1) L1	3.25
Ashland,Ky.(8) A10	3.25
Atlanta A11	3.40
Bessemer,Ala. T2	3.25
Bridgeprt,Conn.(10) S15	3.25
Butler,Pa. A10	3.25
Carnegie,Pa. S18	3.25
Detroit M1	3.45
Ecorse,Mich. G5	3.45
Fairfield,Ala. T2	3.25
Fontana,Calif. K1	4.40
Gary,Ind. C3	3.25
Houston,Tex. S5	3.65
Ind.Harbor,Ind. I-2, Y1	3.25
KansasCity,Mo.(9) S5	3.85
Lackawanna,N.Y. B2	3.25
LosAngeles B3	4.00
Milton,Pa. B6	3.25
Minnequa, Colo. C10	4.30
NewBritain(10) S15	3.25
N.Tonawanda,N.Y. B11	3.30
Pittsburg,Calif. C11	4.00
Pittsburgh J5	3.25
Riverdale,Ill. A1	3.25
SanFrancisco S7	4.00
Seattle B3, N14	4.25
Sharon,Pa. S3	3.25
So.Chicago,Ill. W14	3.25
So.SanFrancisco B3	4.00
SparrowsPoint,Md. B2	3.25
Torrance,Calif. C11	4.00
Warren,O. R2	3.25
Weirton,W.Va. W6	3.25
WestLeechburg,Pa. A4	3.25
Youngstown C3, Y1	3.25

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15	5.10
Carnegie,Pa. S18	5.10
Fontana,Calif. K1	6.30
Gary,Ind. C3	5.10
Houston,Tex. S5	5.50
KansasCity,Mo. S5	5.70
NewBritn,Conn.(10) S15	5.10
Sharon,Pa. S3	5.10
Youngstown C3	5.10

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10) S15	9.50
Carnegie,Pa. S18	9.50
Cleveland A7	9.50
Dover,O. G6	9.50
Harrison,N.J. C18	9.80
NewBritn,Conn.(10) S15	9.50
Pawtucket,R.I.(11) N8	9.50

STRIP, Cold-Finished, Spring Steel (Annealed)

	0.25-0.40c	0.40-0.60c	0.60-0.80c	0.80-1.05c
Bridgeprt,Conn.(10) S15	4.00	5.50	6.10	8.05
Bristol,Conn. W1	...	...	6.40	8.35
Carnegie,Pa. S18	...	5.50	6.10	8.05
Chicago T6	4.25	5.65	6.25	8.20
Cleveland A7	4.00	5.50	6.10	8.05
Dover,O. G6	4.00	5.50	6.10	7.85
Harrison,N.J. C18	...	...	6.40	8.35
Mattapan,Mass. T6	4.50	5.80	6.40	8.35
NewBritn.,Conn.(10) S15	4.00	5.50	6.10	8.05
NewCastle,Pa. B4	4.00	5.50	6.10	...
NewCastle,Pa. E5	4.00	5.50	6.10	8.05
NewYork W3	...	5.80	6.40	8.35
Pawtucket,R.I. N8 Cleve.orPitts.Base	4.55	5.50	6.10	8.05
Worcester,Mass.Base	4.50	5.80	6.40	8.35
Sharon,Pa. S3	4.00	5.50	6.10	8.05
Trenton,N.J. R5	...	6.30	6.90	8.85
Union,N.J. H6	4.40	6.35	6.35	8.30
Wallingford,Conn. W2	4.50	5.80	6.40	8.05
Weirton,W.Va. W6	4.00	5.50	6.10	8.05
Worcester,Mass. A7	4.30	5.80	6.40	8.35
Worcester,Mass, T6	4.50	5.80	6.40	8.35
Youngstown C8	4.50	5.50	6.10	8.05
Pawtucket,R.I.(12) N8				
Sharon,Pa. S3				
Worcester,Mass. A7				
Youngstown C8				

STRIP, Cold-Rolled Carbo

Berea,O. C7	
Bridgeprt,Conn.(10) S1	
Butler,Pa. A10	
Chicago,Ill. T6	
Cleveland A7, J5	
Detroit, D2, D3	
Detroit M1	
Dover,O. G6	
Ecorse,Mich. G5	
Follansbee,W.Va. F4	
Fontana,Calif. K1	
Ind.Harbor,Ind. I-2	
Lackawanna,N.Y. B2	
LosAngeles C1	
Mattapan,Mass.(21) T	
Middletown,O. A10	
NewBritain(10) S15	
NewCastle,Pa. B4, E5	
NewHaven,Conn. A7, D	
NewKensington,Pa. A6	
NewYork W3	
Pawtucket,R.I.(11) N8	
Pawtucket,R.I. (21) N8	
Pawtucket,R.I. R3	
Pittsburgh J5	
Riverdale,Ill. A1	
Sharon,Pa. S3	
SparrowsPoint,Md. B2	
Trenton,N.J.(13) R5	
Wallingford,Conn. W2	
Warren,O. R2, T5	
Weirton,W.Va. W6	
Youngstown C8, Y1	

STRIP, Cold-Rolled, High-strength Low-Allo

Cleveland A7, J5	
Dover,O. G6	
Ecorse,Mich. G5	
Fontana,Calif. K1	
Lackawanna,N.Y. B2	
Pittsburgh J5	
Sharon,Pa. S3	
SparrowsPoint,Md. B2	
Warren,O. R2	
Weirton,W.Va. W6	
Youngstown Y1	

STRIP, Electro Galvanized

Weirton,W.Va. W6	
Youngstown C8	

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$6.45	$6.70	$7.00
Fairfield,Ala. T2	6.55	6.80	7.10
Gary,Ind. C3	6.45	6.70	7.00
GraniteCity,Ill. G4	6.65	6.90	7.20
Ind.Harbor,Ind. I-2, Y1	6.45	6.70	7.00
Irvin,Pa. C3	6.45	6.70	7.00
Niles,O. R2	6.45	6.70	7.00
Pittsburg,Calif. C11	7.20	7.45	7.75
SparrowsPoint,Md. B2	6.55	6.80	7.10
Weirton,W.Va. W6	6.45	6.70	7.00
Yorkville,O. W10	6.45	6.70	7.00

SHEET SILICON (24 Gage Base)

	Field	Arm.	Elec.	Motor	Dyn.
BeechBottom,W.Va. W10	...	5.45	5.95	6.70	7.50
Brackenridge,Pa. A4	...	...	5.95	6.70	7.50
Follansbee,W.Va. F4	...	...	5.95	6.70	7.50
GraniteCity,Ill. G4	...	...	6.15	6.90	7.70
Ind.Harbor,Ind. I-2	5.15	5.45	5.95	...	...
Mansfield,O. E6	5.15	5.45	5.95	6.70	...
Niles,O. M4	5.15	5.45	5.95	...	...
Niles,O. N12	...	5.45	5.95	...	...
Toronto,O. F4	...	5.45	5.95	6.70	7.50
Vandergrift,Pa. C3	...	5.45	5.95	6.70	7.50
Warren,O. R2	...	5.45	5.95	6.70	...
Zanesville,O. A10	...	5.45	5.95	6.70	7.50

COILS AND CUT LENGTHS, Cold-Rolled, Silicon

	Field	Arm.	Elec.	Motor	Dyn.
Vandergrift,Pa. C3	...	5.70	6.20	6.95	7.75
Warren,O. R2	5.40	5.70	6.20	6.95	7.75

SHEETS, Silicon Transformer Grade

	72	65	58	52
BeechBottom,W.Va. W10	8.05	8.60	9.30	10.10
Brackenridge,Pa. A4	8.05	8.60	9.30	....
Follansbee,W.Va. F4	8.05	8.60	9.30	10.10
Toronto,O. F4	8.05	8.60	9.30	10.10
Vandergrift,Pa. C3	8.05	8.60	9.30	10.10
Zanesville,O. A10	8.05	8.60	9.30	10.10

COLD-REDUCED COILS and Cut Lengths, Silicon

	72	T-100	T-90	T-80
Butler,Pa. A10	...	12.35	13.60	14.85
Vandergrift,Pa. C3	8.30	11.35	12.60	13.85
Warren,O. R2	8.30	....	....	....

Key to Producing Companies

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A6 American Shim Steel Co.
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Boiardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B14 A. M. Byers Co.

C1 Calif. Cold-Rolled Steel
C3 Carnegie-Illinois Steel
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve.Cld.Roll.MillsCo.
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Col. Steel & Shafting Co.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel Co.
D4 Disston & Sons,Henry
D6 Driver Harris Co.

E1 Eastrn.Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliot Bros. Steel Co.
E6 Empire Steel Co.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F6 Fretz-Moon Tube Co.

G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes C
G4 Granite City Steel C
G5 Great Lakes Steel C
G6 Greer Steel Co.

H1 Hanna Furnace Cor
H4 Heppenstall Co.
H6 Hind Steel Co.Inc.

I-1 Igoe Bros.Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.

J1 Jackson Iron & Steel
J3 Jessop Steel Co.
J4 Johnson Steel & Wir
J5 Jones & Laughlin St
J6 Joslyn Mfg. & Suppl
J7 Judson Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Me
K3 Keystone Drawn St
K4 Keystone Steel & W
K5 Kidd Drawn Steel C

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Ste
L5 Lockhart Iron & Ste

IP, Hot-Rolled, High-Strength Low-Alloy

semer,Ala. T2	4.95
veland J5	4.95
rse,Mich. G5	5.15
rfield,Ala. T2	4.95
tana,Cal. K1	6.64
y,Ind. C3	4.95
.Harb.,Ind. I-2, Y1	4.95
kawanna,N.Y. B2	4.95
tsburg J5	4.95
ron,Pa. S3	4.95
rrowsPoint,Md. B2	4.95
rren,O. R2	4.95
rton,W.Va. W6	4.95
ngstown C3, Y1	4.95

HT COOPERAGE HOOP

anta A11	3.60
erdale,Ill. A1	3.60
ron,Pa. S3	3.60
ungstown C3	3.60

RE, Cold-Rolled Flat

icago T6	5.35
veland A7	5.00
ver,O. G6	5.00
storia,O. S1	5.50
komo,Ind. C16	5.00
ssillon,O. R8	5.00
nessen,Pa. P7	5.00
wtucket,R.I.(11) N8	5.55
wtucket,R.I.(12) N8	5.50
enton,N.J. R5	5.80
rcester,Mass. A7	5.30
rcester,Mass. T6	5.30

RE, Fine and Weaving (.8-in. Coils)

rtonville,Ill.(19) K4	7.70
ffalo W12	7.70
icago W13	7.70
veland A7	7.70
storia,O. S1	8.20
nnstown,Pa. B2	7.70
komo,Ind. C16	7.70
mer,Mass. W12	8.00
rtsmouth,O. P12	7.70
uthers,O. Y1	7.70
enton,N.J. R5	8.50
ukegan,Ill. A7	7.70
rcester, Mass. A7, T6	8.00

RE (16 gage)	**An'ld. Galv. Stone**	**Stone**
iquippa J5	9.05	10.55
rtnvill(19) K4	9.05	10.55
veland A7	9.05	10.55
storia,O. S1	9.15	10.65
nnstown B2	9.05	10.55
komo C16	9.05	10.10
nnequa C10	9.40	10.90
mer,Mass. W12	9.35	10.85
tts.,Cal. C11	9.40	10.90
tsmth.(18) P12	9.05	10.55
SparrowsPt. B2	9.15	10.65
Struthers Y1	9.05	10.55
Waukegan A7	9.05	10.55

WIRE, Manufacturers Bright, Low-Carbon

AlabamaCity,Ala. R2	4.15
Aliquippa,Pa. J5	4.15
Alton,Ill.(1) L1	4.15
Bartonville,Ill.(1) K4	4.15
Buffalo W12	4.15
Chicago W13	4.15
Cleveland A7, C20	4.15
Crawfrdsvll,Ind. M8	4.30
Donora,Pa. A7	4.15
Duluth A7	4.15
Fairfield,Ala. T2	4.15
Fostoria,O.(24) S1	4.65
Houston S5	4.15
Johnstown,Pa. B2	4.15
Joliet,Ill. A7	4.15
KansasCity,Mo. S5	4.75
Kokomo,Ind. C16	4.25
LosAngeles B3	5.10
Minnequa,Colo. C10	4.50
Monessen,Pa. P7	4.15
Newark,6-8ga. I-1	4.75
No.Tonawanda B11	4.18
Palmer,Mass. W12	4.45
Pittsburg,Calif. C11	5.10
Portsmouth,O. P12	4.15
Rankin,Pa. A7	4.15
So.Chicago,Ill. R2	4.15
So.SanFrancisco C10	5.10
SparrowsPoint,Md. B2	4.25
Sterling,Ill.(1) N15	4.15
Struthers,O. Y1	4.15
Torrance,Calif. C11	5.10
Waukegan,Ill. A7	4.15
Worcester,Mass. A7, T6	4.45

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	5.55
Alton,Ill.(1) L1	5.55
Bartonville,Ill.(19) K4	5.55
Buffalo W12	5.55
Cleveland A7	5.55
Donora,Pa. A7	5.55
Duluth A7	5.55
Fostoria,O. S1	6.05
Johnstown,Pa. B2	5.55
LosAngeles B3	6.50
Milbury,Mass.(12) N6	5.85
Monessen,Pa. P7	5.55
Palmer,Mass. W12	5.85
Pittsburg,Calif. C11	6.50
Portsmouth,O. P12	5.55
So.Chicago,Ill. R2	5.55
SparrowsPoint,Md. B2	5.65
Struthers,O. Y1	5.55
Trenton,N.J. A7	5.85
Trenton,N.J. R5	6.35
Waukegan,Ill. A7	5.55
Worcester A7,J4,T6,W12	5.85

WIRE, Merchant Quality (6 to 8 gage)

	An'ld.	Galv.
Ala.,City, R2	4.80	5.25
Aliquippa J5	4.80	5.25
Atlanta A11	4.90	5.35
Bartnville.(19) K4	4.80	5.25
Buffalo W12	4.80	...
Cleveland A7	4.80	5.25
Crawfrdvll. M8	4.95	5.40
Donora A7	4.80	5.25
Duluth A7	4.80	5.25
Fairfield T2	4.80	5.25
Houston,Tex. S5	5.20	5.65
Johnstown B2	4.80	5.25
Joliet,Ill. A7	4.80	5.25
KansasCity,Mo. S5	5.40	5.85
Kokomo C16	4.90	5.35
LosAngeles B3	5.75	...
Minnequa C10	5.15	5.60
Monessen P7	4.80	5.25
Palmer,Mass. W12	5.10	...
Pitts.,Cal. C11	5.75	6.20
Portsmth.(18) P12	4.80	5.25
Rankin A7	4.80	5.25
So.Chicago R2	4.80	5.25
So.S.Fran. C10	5.75	6.20
SparrowsPt. B2	4.90	5.35
Sterling,Ill.(1)N15	4.80	5.25
Struthers,O. Y1	4.80	5.25
Torrance,Cal. C11	5.75	...
Worcester A7	5.10	5.55

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.20
Alton,Ill.(1) L1	5.20
Buffalo W12	5.20
Cleveland A7	5.20
Donora, Pa. A7	5.20
Duluth A7	5.20
Johnstown,Pa. B2	5.20
LosAngeles B3	6.15
NewHaven,Conn. A7	5.50
Palm r,Mass. W12	5.50
Pittsburg,Calif. C11	6.15
Portsmouth,O. P12	5.20
So.Chicago,Ill. R2	5.20
SparrowsPoint,Md. B2	5.30
Struthers,O. Y1	5.20
Torrance,Calif. C11	6.15
Trenton,N.J. A7	5.50
Waukegan,Ill. A7	5.20
Worcester,Mass. A7	5.50

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	123
Aliquippa,Pa. J5	123
Atlanta A11	125
Bartonville,Ill.(19) K4	123
Crawfordsville M8	126
Donora,Pa. A7	123
Duluth,Minn. A7	123
Fairfield,Ala. T2	123
Houston,Tex. S5	131
Johnstown,Pa. B2	123
Joliet,Ill. A7	123
KansasCity,Mo. S5	135
Kokomo,Ind. C16	125
Minnequa,Colo. C10	130
Monessen,Pa. P7	123
Pittsburg,Calif. C11	143
Portsmouth,O.(18) P12	123
Rankin,Pa. A7	123
So.Chicago,Ill. R2	123
So.SanFran.,Calif. C10	143
SparrowsPoint,Md. B2	125
Sterling,Ill.(1) N15	123

FENCE POSTS

	Col.
Duluth A7	112
Huntington,W.Va. W7	112
Johnstown,Pa. B2	112
Joliet,Ill. A7	112
Minnequa,Colo. C10	120
Moline,Ill. R2	116
Williamspt,Pa. S19	n.t. $120

WOVEN FENCE, 9-15½ gage

	Col.
Ala.City,Ala.,17-18ga.	R2.175
AlabamaCity,Ala.	R2....109
Aliquip.,Pa 9-14½ga.	J5..109
Atlanta A11	111
Bartonville,Ill.(19)	K4 ..109
Crawfordsvll,Ind. M8	...112
Donora,Pa. A7	109
Duluth A7	109
Houston,Tex. S5	117
Fairfield,Ala. T2	109
Johnstown,Pa. B2	109
Johnstn,17ga.,6" B2	183
Johnstn,17ga.,4" B2	186
Joliet,Ill. A7	109
KansasCity,Mo. S5	121
Kokomo,Ind. C16	111
Minnequa,Colo. C10	116
Monessen,Pa. P7	109
Pittsburg,Calif. C11	132
Portsmouth,O.(18)	P12..109
Rankin, Pa. A7	109
So.Chicago,Ill. R2	109
Sterling,Ill.(1) N15	109

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	106
Atlanta A11	107
Bartonville,Ill.(19) K4	106
Chicago W13	106
Crawfordsville M8	109
Donora,Pa. A7	106
Duluth A7	106
Fairfield,Ala. T2	106
Joliet,Ill. A7	106
Kokomo,Ind. C16	108
Minnequa,Colo. C10	113
Pittsburg,Calif. C11	130
Portsmouth,O.(18) P12	106
So.Chicago,Ill. R2	106
So.SanFran., Calif. C10	130
SparrowsPoint,Md. B2	108
Sterling,Ill.(1) N15	106

NAILS & STAPLES, Stock (To Dealers & Mfrs.)

AlabamaCity,Ala. R2	103
Aliquippa,Pa. J5	103
Atlanta A11	105
Bartonville,Ill.(19) K4	103
Cleveland A9	110
Crawfordsvile M8	106
Donora,Pa. A7	103
Duluth A7	103
Fairfield,Ala. T2	103
Houston,Tex. S5	111
Johnstown,Pa. B2	103
Joliet,Ill. A7	103
KansasCity,Mo. S5	115
Kokomo,Ind. C16	105
Minnequa,Colo. C10	110
Monessen,Pa. P7	103
Pittsburg,Calif. C11	122
Portsmouth,O. P12	103
Rankin,Pa. A7	103
So.Chicago,Ill. R2	103
SparrowsPoint,Md. B2	105
Sterling,Ill.(1) N15	103
Torrance,Calif. C11	123
Worcester,Mass. A7	109

NAILS, Cut (100 lb keg)

Conshohocken,Pa. A3	$6.75
Wheeling,W.Va. W10	6.75

NAILS & STAPLES, Stock (To Jobbers)

Chicago,Ill. W13	103
Minnequa,Colo. C10	107
Portsmouth,O. P12	100

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	5.20
Bartonville,Ill.(19) K4	5.20
Donora,Pa. A7	5.20
Duluth A7	5.20
Johnstown,Pa. B2	5.20
Joliet,Ill. A7	5.20
Kokomo,Ind. C16	5.30
Minnequa,Colo. C10	5.55
Pittsburg,Calif. C11	6.15
Portsmouth,O. P12	5.20
Rankin,Pa. A7	5.20
So.Chicago,Ill. R2	5.20
SparrowsPoint,Md. B2	5.30
Worcester,Mass. A7	5.50

AXLES

Fairfield,Ala. T2	5.20
Gary,Ind. C3	5.20
Ind.Harbor,Ind. S13	5.20
Johnstown,Pa. B2	5.20
McKeesRocks,Pa. C3	5.20

TIE PLATES

Fairfield,Ala. T2	4.05
Gary,Ind. C3	4.05
Ind.Harbor,Ind. I-2	4.05
Lackawanna,N.Y. B2	4.05
Minnequa,Colo. C10	4.05
Pittsburg,Calif. C11	4.20
Pittsburgh R2	4.05
Seattle B3	4.50
Steelton,Pa. B2	4.05
Torrance,Calif. C11	4.20
Weirton,W.Va. W6	4.05

JOINT BARS

Bessemer,Pa. C3	4.25
Fairfield,Ala. T2	4.25
Ind.Harbor,Ind. I-2	4.25
Joliet,Ill. C3	4.25
Lackawanna,N.Y. B2	4.25
Minnequa,Colo. C10	4.25
Steelton,Pa. B2	4.25

TRACK BOLTS

	(20) Treated
Fairfield,Ala. T2	8.50
Lebanon,Pa. B2	8.50
Minnequa,Colo. C10	8.25
Pittsburgh,Pa. O3, P14	8.50

STANDARD TRACK SPIKES

Fairfield,Ala. T2	5.35
Ind.Harbor,Ind. I-2, Y1	5.35
Kansas City, Mo. S5	5.60
Lebanon,Pa. B2	5.35
Minnequa,Colo. C10	5.35
Pittsburgh J5	5.35
So.Chicago,Ill. R2	5.35
Struthers,O. Y1	5.35
Youngstown R2	5.35

LIGHT RAILS, Rail Steel

Huntington,W.Va. W7	3.55
Williamsport,Pa. S19	3.55

PE WIRE

	Mild Plow	Plow	Imp. Plow
rtonville,Ill. K4	7.10	7.40	7.80
ffalo W12	7.50	7.80	8.20
veland A7	7.50	7.80	8.20
nora,Pa. A7	7.50	7.80	8.20
storia,O. S1	8.00	8.30	8.70
nnstown,Pa. B2	7.50	7.80	8.20
nessen,Pa. P7	7.50	7.80	8.20
wHaven,Conn. A7	7.80	8.10	8.50
mer,Mass. W12	7.80	8.10	8.50
rtsmouth,O. P12	7.50	7.80	8.20
arrowsPoint,Md. B2	7.60	7.90	8.30
uthers,O. Y1	7.50	7.80	8.20
enton,N.J. A7	7.80	8.10	8.50
enton,N.J. R5	8.00	8.30	8.70
ukegan,Ill. A7	7.50	7.80	8.20
illiamsport,Pa. B2	7.60	7.90	8.30
rcester,Mass. J4	7.50	7.80	8.20

RAILS	**Std. No. 1**	**Std. No. 2**	**Std. All No. 2**	**TeeRails 60 lb. Under**
Bessemer,Pa. C3	3.20	3.10	3.15	3.55
Ensley,Ala. T2	3.20	3.10	3.15	3.55
Fairfield,Ala. T2	...	...	...	3.55
Gary,Ind. C3	3.20	3.10	3.15	...
Ind.Harbor,Ind. I-2	3.20	3.10	3.15	...
Johnstown,Pa. B2	...	...	...	(16) 3.55
Lackawanna B2	3.20	3.10	...	3.55
Minnequa,Colo. C10	3.20	3.10	...	4.25
Steelton,Pa. B2	3.20	3.10	...	...

Key to Producing Companies

Lone Star Steel Co.
Lukens Steel Co.
McLouth Steel Corp.
Mahoning Valley Steel
Medart Co.
Mercer Tube & Mfg. Co.
Mid-States Steel & Wire
Midvale Co.
0 Missouri-Illinois Furnace
2 Moltrup Steel Products
3 Monarch Steel Co.
National Supply Co.
National Tube Co.
Nelsen Steel & Wire Co.
New Eng.High Carb.Wire
Newman-Crosby Steel
2 Niles Rolling Mill Co.
4 Nrthwst. Steel Roll. Mills
5 Northwestern S.&W. Co.
6 New Delphos Mfg. Co.
Oliver Iron & Steel Corp.
Oregon Steel Mills
Pacific States Steel Corp.
Pacific Tube Co.
Pilgrim Drawn Steel
Pittsburgh Coke & Chem.
Pittsburgh Steel Co.
Pittsburgh Tube Co.

P11 Pollak Steel Co.
P12 Portsmouth Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R7 Rotary Electric Steel Co.
R8 Reliance Div., Eaton Mfg.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
T2 Tenn. Coal, Iron & R.R.

T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
U4 Universal-Cyclops Steel
V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.
W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Corp.
W7 W. Va. Steel & Mfg. Co.
W8 Wstrn.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Co.
W15 Woodward Iron Co.
W16 Worth Steel Co.
W18 Wyckoff Steel Co.
Y1 Youngstwn. Sheet & Tube

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	19.00	18W,4Cr,3V	114.50
Extra Carbon	22.00	18W,4Cr,2V,9Co	168.50
Spec. Carbon	26.50	18W,4Cr,2V,6Co	154.00
Oil Hardening	29.00	18.25W,4.25Cr,1V,4.75Co	142.00
Hi.-Carbon-Cr	52.00	20.25W,4.25Cr,1.6V,12.25Co	266.50
Cr Hot Wrk.	29.00	1.5W,4Cr,1V,8.5Mo	65.00
18W,4Cr,1V	90.50	6.4W,4.5Cr,1.9V,5Mo	69.50
18W,4Cr,2V	102.50	6W,4Cr,3V,6Mo	88.00

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M9, R2, S8, T7, U4, V2, V3.

(1) Chicago Base. (2) Angles.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. Base.
(8) 16 gage and heavier.
(9) 6" and narrower.
(10) Pittsburgh Base.
(11) Cleveland & Pittsburgh Base.
(12) Worcester, Mass. Base.
(13) 3" & wider; over ½" to under 2" 5.50c.
(14) Also wide flange beams.
(15) ½" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh Base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. Base.
(22) Del. San Fran. Bay area.
(23) Angles 1"x1" to 1¼"x1¼" only.
(24) Deduct 0.35c for finer than 15 Ga.

STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % —Black— A	B	C	—Galvanized— D	E	F
⅛	5.5c	0.24	41.5	39.5	38.5	13.5	11.5	10.5
¼	6.0	0.42	39.5	37.5	36.5	15.5	13.5	12.5
⅜	6.0	0.57	36	34	33	12.5	10.5	9.5
½	8.5	0.85	43	41	42	26.5	24.5	25.5
¾	11.5	1.13	46	44	45	30.5	28.5	29.5
1	17.0	1.68	48.5	46.5	47.5	33.5	31.5	32.5
1¼	23.0	2.28	49	47	48	34	32	33
1½	27.5	2.73	49.5	47.5	48.5	34.5	32.5	33.5
2	37.0	3.68	50	48	49	35	33	34
2½	58.5	5.82	50.5	48.5	49.5	35.5	33.5	34.5
3	76.5	7.62	50.5	48.5	49.5	35.5	33.5	34.5

Column A: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va. 1½ percentage points lower on ⅛", 2 points lower on ¼", 3 points lower ⅜", W10; Wheatland, Pa., 2 points lower on ⅛ through ⅜", W9. Following make ½ through 3" only: Lorain, O. N3; Youngstown R2, Y1; Aliquippa, Pa. J5. Fontana, Calif., K1 quotes 11 points lower on ½" through 3".

Columns B & E: Sparrows Point Md. B2; Wheatland, Pa., ⅛" through ⅜", W9.

Columns C & F: Alton, Ill. (Lorain, O. Base) LI; Indiana Harbor, Ind., ½" through 3", Y1.

Column D: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa., ⅛" through ⅜", F6; Benwood, W. Va., except 3½ points lower on ⅛", 2½ pts on ¼", 3 pts on ⅜" W10; Wheatland, Pa., except 2 pts lower on ⅛" through ⅜" W9. Following make ½" through 3" only; Lorain N3; Youngstown R2, Y1; Aliquippa, Pa. J5. Fontana, Calif., K1 quotes 11 points lower on ½" through 3".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.0c	3.68	38.5	23	38.5	23
2½	58.5	5.82	41.5	26	41.5	26
3	76.5	7.62	41.5	26	41.5	26
3½	92.0	9.20	43.5	28	43.5	28
4	$1.09	10.89	43.5	28	43.5	28
5	1.48	14.81	43.5	28	43.5	28
6	1.92	19.18	43.5	28	43.5	28

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5; Lorain, O. N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 4 to 24 in., inclusive.

O.D. In.	B.W. Ga.	—Seamless— H.R.	C.D.	Elec. Weld H.R.	C.D
1	13	11.50	13.39	13.00	13.00
1¼	13	13.62	15.87	13.21	15.39
1½	13	15.05	17.71	14.60	17.18
1¾	13	17.11	20.15	16.60	19.54
2	13	19.18	22.56	18.60	21.89
2¼	13	21.37	25.16	20.73	24.40
2½	12	23.54	27.70	22.83	26.88
2½	12	25.79	30.33	25.02	29.41
2¾	12	27.33	32.14	26.51	31.18
3	12	28.68	33.76	27.82	32.74
3¼	11	33.39	39.29	32.39	38.11
3½	11	35.85	42.20	34.78	40.94
4	10	44.51	52.35	43.17	50.78
4½	9	58.99	69.42	....	....
5	9	68.28	80.35	....	....
6	7	104.82	123.33	....	....

Boiler tube producers include Babcock & Wilcox Tube Co., National Tube Co., Globe Steel Tubes Co., Pacific Tube Co., Pittsburgh Steel Co., Republic Steel Corp., Standard Tube Co.

CLAD STEELS

(Cents per pound)

Cladding Stainless	—Plates— Carbon Base 10%	20%	—Strip— Cold-Rolled Carbon Base 10% Both Sides		—Sheets— Carbon Base 10%	20%	Copper Base Both Sides
302	....	....	....	....	19.75	21.50	75.00
304	22.50	26.50	....	....	20.75	22.50	77.00
305	....	....	....	....	....	....	79.00
309	27.00	31.00	....	....	....	....	....
310	32.50	36.50	....	....	....	....	105.00
316	27.00	31.00	....	....	26.00	28.00	....
317	30.50	34.50	....	....	....	....	....
318	29.50	33.50	....	....	....	....	....
321	23.50	27.50	....	....	23.00	25.00	90.00
347	25.00	29.00	....	....	24.00	26.00	94.00
405	18.75	24.75	....	....	....	....	....
410	18.25	24.25	....	....	....	....	....
430	18.25	24.25	....	....	....	....	....
Nickel	27.50	34.50	31.50	41.00	....	....	88.00
Inconel	36.00	46.00	....	....	....	....	115.00
Monel	29.00	37.00	26.50	33.50	....	....	83.00
Copper*	....	....	19.75†	23.75†	....	....	....

* Deoxidized. † Deduct 4.25c for hot-rolled. Production for carbon base products are: Stainless plates and sheets, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16 and Coatesville, Pa. L7; nickel, inconel and monel-clad plates, Coatesville L7; nickel, monel and copper-clad strip, Carnegie, Pa. S18. Production point for copper-base sheets is Carnegie A13.

BOLTS, NUTS

(To consumers)

F.o.b. midwestern plants. Additional discounts on carriage, machine bolts, 5 for cl; 15 for full containers, except tire and plow bolts.

CARRIAGE, MACHINE BOLTS

(Per cent off list)

½-in., smaller; up to 6 in. long 35
⅝ & ⅞ x 6 in., shorter. 37
⅞-in. & larger x 6 in., shorter 34
All diameters longer than 6-in. 30
Tire bolts 25
Plow bolts 47
Lag bolts, 6 in., shorter 37
Lag bolts, longer than 6 in. 35

NUTS

Semifinished hexagon	A.S. Light	Reg. & Heavy
⅞-in., smaller	.41 off	....
½-in., smaller	....	38 off
½-in.-1-in.	.39 off	....
⅛-in.-1-in.	....	37 off
1⅛-in.-1½-in.	.37 off	35 off
1⅝-in., larger	.34 off	28 off

Additional discount of 15 for full containers.

STOVE BOLTS

In packages, nuts separate, 58½-10 off; bulk 70 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

SQUARE HEAD SET SCREWS

Upset 1-in. & smaller.51 off
¾, ⅞, & 1 x 6-in. & shorter .....35 off
Headless, ¼-in., larger.31 off

HEXAGON CAP SCREWS

(Packaged)

Upset 1-in. smaller by 6-in. and shorter (1020 bright) ..... 46 off
Upset (1035 heat treated) ⅝ and smaller x 6 and shorter ..... 40 off

RIVETS

F.o.b. midwestern plants
Structural ½-in., larger 6.75c
⅞-in., under .....48 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers .....Net to $1 off

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Inches Diam.	Length	Cents per lb.
17,18,20	60,72	16.00
8 to 16	48,60,72	16.50
7	48,60	17.75
6	48,60	19.00
4,5⅛	40	19.50
3	40	20.50
2½	24,30	21.00
2	24,30	23.00

CARBON

40	100,110	7.50
35	100,110	7.50
30	84,110	7.50
24	72 to 104	7.50
17 to 20	84,90	7.50
14	60,72	8.00
10,12	60	8.25

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $37; less than 60%, $34.
Imported, net ton, duty paid, metallurgical grade, $39-$40.

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301	37.50	30.50	28.50
302	37.50	33.00	28.50
303	39.50	36.50	31.00
304	39.50	35.00	30.00
309	52.00	52.00	41.50
316	53.00	55.00	46.00
321	45.50	44.50	34.00
347	50.00	48.50	38.50
410	33.00	27.00	23.00
416	33.50	33.50	23.50
420	40.50	43.50	28.50
430	35.50	27.50	23.50
501	24.00	22.50	11.50
502	25.00	23.50	12.50

Baltimore, Types 301 through 347 sheets, except 309 E2.
Baltimore, bars, wire and structurals A10.
Brackenridge, Pa., sheets A4.
Bridgeville, Pa., bars, wire, sheets & strip, except Type 309 strip quoted 51.00c U4.
Butler, Pa., sheets and strip except Types 309, 501 & 502 A10.
Carnegie, Pa., strip except Type 416; Type 309 strip quoted 51.00c S18.
Cleveland, strip, except Type 309 quoted 51.00c, and except Type 416 A7.
Detroit, strip, except Type 309 M1.
Dunkirk, N. Y., bars, wire A4.
Duquesne, Pa., bars C3.
Gary, Ind., sheets except Type 416 C3.
Harrison, N. J., strip C18.
Massillon, all products, except Type 309 bars, wire & structurals quoted 42.00c, Type 501, 10.50c, Type 502 11.50c R2.
McKeesport, Pa., bars; sheets except Type 416, C3.
McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.
Middletown, O., sheets and strip, except Types 501 and 502 and except 309 strip quoted 51.00c A10.
Midland, sheets & strip C18.
Munhall, Pa., bars C3.
Pittsburgh, sheets C18.
Reading, Pa., bars & strip except Type 309 bars quoted 42.00c C4.
So. Chicago, Ind., bars & structurals C3.
Syracuse, N. Y., bars, wire & structurals C18.
Titusville, Pa., bars U4.
Wallingford, Conn., strip, except 309, W2 quotes ¼-cent higher.
Washington, Pa., bars, sheets & strip except Type 309 strip quoted 51.00c J3.
Washington, Pa., Types 301 through 347 sheets & strip except 303 & 309; 316 sheets 58.00c strip 60.00c W4.
Watervliet, N. Y., structurals & bars A4.
Waukegan, bars & wire A7.
West Leechburg, Pa., strip, except Type 309 quoted 51.00 A4.
Youngstown, strip C8.

COAL CHEMICALS

Spot, cents per gallon, ovens
Pure benzol 20.00
Toluol, one deg..19.00-23.50
Industrial xylol ..20.50-26.50

Per ton bulk, ovens
Sulphate of ammonia..$45.00

Per pound, ovens
Phenol, 40 (carlots, returnable drums) 13.25
Do., less than carlots..14.00
Do., tank cars 12.50

METAL POWERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh)

Sponge Iron:
98+% Fe, carlots... Swedish, c.i.f. New York, in bags..7.40
Electrolytic Iron:
Annealed, 99.5% Fe.
Unannealed, 99+% Fe
Unannealed, 99+% Fe (minus 325 mesh)
Aluminum:
1500-lb lots, freight allowed
Atomized, 500-lb drums, freight allowed
Brass, 10-ton lots.23.25-
Copper:
Electrolytic 2
Reduced
Lead
Manganese:
Minus 100 mesh 52.00-
Minus 35 mesh.....
Minus 200 mesh.....
Nickel, unannealed61.00-
Silicon 34.00-
Solder (plus cost of metal)
Stainless Steel, 302...
Zinc, 10-ton lots..15.50-
Do
Tungsten:
99%, minus 80 to mesh, freight allowed 1000 lb and over .. 500 to 1000 lb .... less than 500 lb ...
98.8%, minus 65 m freight allowed, 1000 lb and over .. less than 1000 lb ..
Tin
Molybdenum:
99%, minus 80 or 100 m over 1000 lb ..... over 500 to 1000 lb . 200 to 500 lb ..... less than 200 lb ..
82-88%, freight allowe 2000 lb and over .. less than 2000 lb ..
Chromium, electrolytic, 99% Cr min.....

METALLURGICAL CO

Price per Net Ton

BEEHIVE OVENS

Connellsvll, fur. $13.00-1
Connellsvll, fdry 15.50-1
New River, foundry....1
Wise county, foundry..1
Wise county, furnace..1

OVEN FOUNDRY COKE

Kearny, N. J., ovens.$2
Everett, Mass., ovens ..
New England, del.‡..2
Chicago, ovens 2
Chicago, del. .....†2
Detroit, del. 2
Terre Haute, ovens....2
Milwaukee, ovens 2
Indianapolis, ovens....1
Chicago, del. 2
Cincinnati, del. 2
Detroit, del. 2
Ironton, O., ovens 1
Cincinnati, del. 2
Painesville, O., ovens..2
Buffalo, del. 2
Cleveland, del. 2
Erie, del. 2
Birmingham, ovens 1
Philadelphia, ovens 2
Swedeland, Pa., ovens.2
Portsmouth, O., ovens.1
Detroit, ovens 2
Detroit, del. *2
Buffalo, del. 2
Flint, del. 2
Pontiac, del. 2
Saginaw, del. 2

Includes representative switching charge *, $1.05; †, $1.45, one-t charge being $1.20, tracks $1.40, and three more tracks $1.50. within $4.03 freight from works.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R. 15 Ga.	Galv. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§		Carbon	Floor
ew York (city)	5.60	6.51	7.10	5.82	...	5.77	6.31	8.28	5.53	5.85	7.36
ew York (c'try)	5.40	6.31	6.90	5.62	...	5.57	6.11	8.08	5.33	5.65	7.16
ston (city) ..	5.75	6.75[**]	7.16	5.80	...	5.72	6.22	8.77	5.62	5.95	7.45
ston (c'try) .	5.55	6.55[**]	6.96	5.60	...	5.52	6.02	8.57	5.42	5.75	7.25
lla. (city)...	5.90	6.45-6.49	6.88	5.65	...	5.65	6.21	8.10	5.35	5.60	6.80
lla. (c'try) ..	5.65	6.20-6.24	6.63	5.40	...	5.40	5.96	7.85	5.10	5.35	6.55
lt. (city)....	5.46	6.36	6.81	5.52	...	5.57	6.05	...	5.51	5.71	7.16
lt. (c'try)...	5.31	6.21	6.66	5.37	...	5.42	5.91	...	5.36	5.56	7.01
rfolk, Va. ..	5.80‡	...	...	...	...	6.05	7.05	...	6.05	6.05	7.55
ash. (w'hse).	6.07‡	...	...	5.83	...	5.88	6.62	...	5.82	6.02	7.47
ffalo (del.)..	5.00‡	5.90	7.57	5.39	6.42	5.10	5.60	10.13	5.15	5.50	7.06
ffalo (w'hse)	4.85‡	5.75	7.42	5.24	6.27	4.95	5.40	9.60	5.00	5.35	6.91
tts. (w'hse)..	4.85	5.75[4*]	6.80	5.00	6.00	4.90	5.40	9.20††	4.90	5.05	6.55
troit (w'hse).	5.32	6.22[4*]	7.35	5.42	6.42-6.73	5.48	5.90	8.44-8.59	5.48	5.67	7.02
eveland (del.)	5.00	5.90	6.70	5.15-5.18	6.15	5.15-5.16	5.60	7.84-8.00	5.15-5.16	5.35-5.36	6.80-6.81
eve. (w'hse) .	4.85	5.75	6.55	5.00-5.03	6.00	5.00-5.01	5.45	7.84-7.85	5.00-5.01	5.20-5.21	6.65-6.66
ncin. (w'hse).	5.27‡	5.94[**]	6.83	5.39	6.10	5.44	5.95	...	5.44	5.64	7.05
icago (city) .	5.05	5.95[4]	7.05	5.05	6.35-6.85	5.10	5.60	7.90[5]	5.10	5.30	6.75
icago (w'hse)	4.85	5.75[4]	6.85	4.85	6.15-6.65	4.90	5.40	7.70[5]	4.90	5.10	6.55
lwaukee (city)	5.18	6.08[4]	7.18	5.18	6.48-6.98	5.23	5.78	8.03[5]	5.23	5.43	6.88
lwau. (c'try).	5.03	5.93[4]	7.03	5.03	6.33-6.83	5.08	5.63	7.88[5]	5.08	5.28	6.73
. Louis (del.)	5.37	6.27[4]	7.44	5.34	6.64	5.39	6.19[6]	6.64	5.39	5.59	7.04
. L. (w'hse) .	5.22	6.12[4]	7.29	5.19	6.49	5.24	6.04[6]	6.49	5.24	5.44	6.89
rm'ham (city)	5.00	5.90	6.55	5.00	...	5.00	6.83	...	5.05	5.25	7.69
rm'ham (c'try)	4.85	5.75	6.40	4.85	...	4.85	6.68	...	4.90	5.10	7.54
naha, Nebr...	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
s Ang. (city)	5.60	7.15	7.60	6.10	7.75	5.75	7.40	...	5.60	5.65	7.90
A. (w'hse)..	5.45	7.00	7.45	5.95	7.60	5.60	7.25	...	5.45	5.50	7.75
n Francisco..	6.15[10]	7.50[8]	7.80	6.75[10]	8.25[8]	5.90[10]	7.55	10.85[2]	5.90	6.35	8.10
attle-Tacoma.	6.70[7‡]	8.15[3]	8.80	6.70[7]	...	6.20[7]	8.15[1]	10.10	6.00[7]	6.35[7]	8.40[7]

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage tra excluded); § as rolled; ** 17 gage; †† as annealed. Base quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-nished bars, 1000 lb and over; galvanized sheets, 450 lb to 1499 lb; [1]—1500 lb and over; [2]—1000 to 4999 lb; [3]—450 to 1499 lb; [4]—400 to 1499 lb; —1000 to 1999 lb; [6]—1000 lb and over; [7]—300 to 999 lb; [8]—1500 to 1999 lb; [9]—400 to 3999 lb; [10]—400 lb and over; [11]—500 to 1499 lb.

REFRACTORIES

(Prices per 1000 bricks, f.o.b. plant)

FIRE CLAY BRICK

per Duty: St. Louis, Vandalia, Farber, exico, Mo., Olive Hill, Ky., Clearfield, or urwensville, Pa., Ottawa, Ill., $100. Hard-red, $135 at above points.

igh-heat Duty: Salina, Pa. $85; Woodbridge, . J., St. Louis, Farber, Vandalia, Mexico, o., West Decatur, Orviston, Clearfield, Beach reek, or Curwensville, Pa., Olive Hill, itchins, Haldeman, or Ashland, Ky., Troup, Athens, Tex., Stevens Pottery, Ga., Ports-outh, or Oak Hill, O., Ottawa, Ill., $80.

ntermediate-Heat Duty: St. Louis, or Van-alia, Mo., West Decatur, Orviston, Beach reek, or Clearfield, Pa., Olive Hill, Hitchins, Haldeman, Ky., Athens, or Troup, Tex., tevens Pottery, Ga., Portsmouth, O., Ottawa, l., $74.

ow-Heat Duty: Oak Hill, or Portsmouth, O., learfield, Orviston, Pa., Bessemer, Ala., Ot-awa, Ill., $66.

LADLE BRICK

ry Press: $55, Freeport, Merill Station, learfield, Pa., Chester, New Cumberland, . Va.; Irondale, Wellsville, O.

Wire Cut: $53, Chester, New Cumberland, . Va.; Wellsville, O.

MALLEABLE BUNG BRICK

t. Louis. Mo., Olive Hill, Ky., Ottawa, Ill., 90; Beach Creek, Pa., $80.

SILICA BRICK

ft. Union, Claysburg, or Sproul, Pa., Ensley, la., $80; Hays, Pa., $85; Joliet or Rockdale, l., E. Chicago, Ind., $89; Lehi, Utah, Los ngeles, $95.

Eastern Silica Coke Oven Shapes: Claysburg, ft. Union, Sproul, Pa., Birmingham, $80.

Illinois Silica Coke Oven Shapes: Joliet or ockdale, Ill., E. Chicago, Ind., Hays, Pa., 81.

BASIC BRICK

Base prices per net ton; f.o.b. works, Balti-more or Chester, Pa.)

Burned chrome brick, $66; Chemical-bonded hrome brick, $69; magnesite brick, $91; hemical-bonded magnesite, $80.

MAGNESITE

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, ⅜" grains; Bulk, 30.50-$31; single paper bags, $35-$35.50.

DOLOMITE

(Base prices per net ton)

Domestic, dead-burned bulk; Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Mill-ville, W. Va., Narlo, Millersville, Martin, Gibsonburg, Woodville, O., $12.25; Thornton, McCook, Ill., $12.35; Dolly Siding, Bonne Terre, Mo., $12.45

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports. Any increase or decrease in R.R. freight rates, dock handling charges and taxes thereon are for buyer's account.

Old range bessemer	$7.60
Old range nonbessemer	7.45
Mesabi bessemer	7.35
Mesabi nonbessemer	7.20
High phosphorus	7.20

EASTERN LOCAL ORE

Cents per unit, del. E. Pa.

Foundry and basic 56.62% concentrates, contract	16.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot:	17.00
Long-term contract	15.00
Brazil iron ore, 68-69%	18.50

TUNGSTEN ORE

Wolframite, scheelite, net ton unit, duty paid	$20-$22

MANGANESE ORE

Long term contracts, nominal; nearby, 48%, duty paid, 81.8c-83.8c per long ton unit, c.i.f. U. S. ports; prices on lower grades adjusted to manganese content and impurities.

CHROME ORE

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48% 2.8: 1	$35.00
48% 3:1	37.50
48% no ratio	28.50-29.00

South African Transvaal

44% no ratio	$19.00-20.00
45% no ratio	19.50-21.00
48% no ratio	27.00-28.00
50% no ratio	28.50-29.00

Brazilian

44% 2.5:1 lump	$32.00

Rhodesian

45% no ratio	$20.00-21.00
48% no ratio	28.00-29.00
48% 3:1 lump	37.50

Domestic—rail nearest seller

48% 3:1	$39.00

MOLYBDENUM

Sulphide concentrates per lb, molybdenum content, mines	$0.90

FERROALLOYS

Manganese Alloys

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $65, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $172 per gross ton of alloy, c.l., packed, $184; gross ton lots, packed, $199; less gross ton lots, packed, $216; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Welland, Ont. Base price: $174, f.o.b. Birmingham and Johnstown, Pa., furnaces; $172, Sheridan, Pa.; $175, Etna, Pa. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $214; less gross ton lots, $231 f.o.b. Chicago. Add or subtract $2.15 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c. Delivered. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Carload 2" x D, packed 35.5c per lb of metal, ton lot 37c, less ton 39c. Delivered. Spot, add 2c.

Manganese, Electrolytic: Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn., Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.95c per lb of alloy, carload packed, 9.70c, ton lot 10.60c, less ton 11.60c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. Spot, add 0.25c.

Chromium Alloys

High-Carbon Ferrochrome: Contract, c.l., lump, bulk, 20.5c per lb of contained Cr, c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

(Please turn to page 161)

Tin Market Remains Unsettled

Reopening of trading on London Metal Exchange featured by establishment of record-breaking premium on spot. Straits tin quoted down to 90.00c for January delivery

New York—Tin market is erratic as it seeks its true level following resumption of trading on the London Metal Exchange. Record-breaking premiums, ranging up to £64 per ton for prompt standard tin, featured initial sessions.

No market was established at Singapore on the first day of trading there, because of insufficient bids. The world price level will depend largely on quotations in that market.

Prices for Grade A tin here were quoted nominally from 90.00c for January arrival to 92.50c for prompt delivery during the week.

While copper maintained its strong position, undetone of the lead and zinc markets weakened. A leading custom smelter reduced the price of lead ¼-cent a pound on Nov. 16 and several other sellers lowered their zinc prices to the lower level of the previously quoted range of 9.75c to 10.00c, East St. Louis.

Tin—Opening quotations for spot tin on the London Metal Exchange were £700 per ton bid; £705 offered. Three months forward tin was quoted at £620 bid and £625 offered. Sales of prompt tin on the opening day, Nov. 15, totaled 165 tons and were made at prices ranging from £725 10s to a low of £715. The closing price quoted £719 bid. Sales of Standard tin futures totaled 45 tons at prices ranging from £680 to a low of £660, and closing at £655 bid. The spot price equivalent is 89.875c while the futures price equivalent is 81.875c, or a premium of 8 cents a pound for prompt delivery.

The British Ministry of Supply is the only holder of tin in England and is in a position to establish the premium on spot metal. Trade authorities here pointed out the fact buyers were unwilling to buy futures at a sharp discount from the spot price indicated they have little faith in the market.

On the second day of free trading, buyers were still seeking cheaper metal. At the opening session, spot tin was bid at £707 10s with offers at £712 10s. This was equal to about 88.40c a pound bid and about 89.00c offered. Futures were bid at £650 and offers made at £655, or 81.25c a pound bid and 81.87c offered. On Thursday, opening quotations for spot were £700 bid, £705 offered, while futres were £620 bid and £625 offered. At the close of the morning session, spot was quoted £690 bid and £695 offered. The settlement price was £695. Futures were £617 bid and £620 offered.

Copper—October shipments of refined copper by producers and custom smelters to domestic consumers were the highest in seven months and producers' stocks of metal were reduced sharply. In view of the steady decline in stocks, it is believed copper will have to go on allocation if new demands continue much longer in the heavy volume experienced the last two months.

Output of crude copper in October from primary sources rose to 62,790 tons from 57,460 tons, while refinery output showed an increase of about 7000 tons to a total of 86,882 tons.

Deliveries in October totaled 108,192 tons, a gain of 5077 over September deliveries of 103,115, largest monthly total since March when shipments aggregated 113,154 tons. These figures do not include copper taken by the government for stockpiling. It is believed that, if such shipments were included. October copper use would total over 123,000 tons and September deliveries would have been reported around 115,000 tons.

Copper industry sources say November shipments of refined copper to manufacturers will at least equal the October rate. Sales already booked by producers call for 96,000 tons of copper this month.

Stocks of refined metal at refineries dropped 29,426 tons to only 164,464 compared with 217,167 at end of August. During the last 60 days, stocks have been reduced by about 52,700 tons.

Lead—A leading custom smelter reduced the price of lead to 12.50c, New York, on Nov. 16, reduction of ¼-cent a pound. Earlier in the week, St. Joseph Lead Co. reduced its price a like amount to 12.75c, New York, and 12.55c, St. Louis, meeting a similar price cut made in the preceding week by the leading custom smelter interests. Despite the price reductions, consumers are still buying hand-to-mouth.

Zinc—Settlement of the steel strike has failed to bring out the expected heavy purchasing by galvanizing interests. This lag in interest has forced return to the 9.75c-cent basis, following a short-lived advance by some suppliers to the 10-cent level.

Remelt Aluminum Output

Washington—Production of aluminum ingot at secondary smelters dropped to a new low level in July, reports Bureau of Mines. Output of only 5981 tons represented a decline of 28 per cent from the June production.

Consumption of aluminum-base scrap decreased from 8765 tons in June to 6639 tons in July, the smallest quantity ever reported consumed in this survey. The use of plant scrap items fell 27 per cent during July, but obsolete scrap declined only 18 per cent.

Government's Tin Stocks Rise

Washington—Stocks of tin held by the government in its permanent stockpile increased over 11,000 t during September and October, bri ing the total to about 85,000 tc according to trade estimates. Dur the first 10 months of this y Reconstruction Finance Corp.'s ceipts of tin exceeded deliveries about 46,598 tons compared w 19,841 tons in the like period a y ago.

Office of Domestic Commerce ports that total receipts of tin October amounted to 10,188 t compared with 9479 tons in Septe ber, including 2964 tons and 2 tons, respectively, of smelter outp Imports of tin for account of R eased to 4121 tons in October fr 5902 tons in September, while th for industry account increased sha ly to 3103 tons from only 667.

Allocations by RFC slumped to o 370 tons in October from 3605 t in the preceding month, while th by industry jumped to 3542 tons fr 564 tons. RFC stocks at the end October amounted to 22,403 tons co pared with 20,873 tons at the end September.

Reynolds Cuts Cable Prices

Louisville—Reynolds Metals this city, has reduced the price aluminum cable, steel reinfor (ACSR), 1.88 to 4.31 cents per pou from the original contract schedu The reduction is made possible by fact the company is able to place n cable mill facilities into product far in advance of original anticipa time, says David P. Reynolds, v president and manager of the gene sales division.

This is the cable being shipped Reynolds at a rate of more than million pounds monthly to help relie the acute conductor shortage th has held up rural electrification seriously the past few years.

Mr. Reynolds announces importa changes have been made in t Reynolds - Wisconsin Electric operative contract which now eli inates the necessity for the 4-ce per pound advance deposit forme required of REA Co-op purchase A new optional purchase plan n enables the REA Co-op buyer obtain his requirements of ACSR either of two ways: 1—By sing orders at prices current at that tim 2—by an 8-year contract at a gua anteed price and supply.

The following table shows both t old and new prices and the savin effected.

Size No.	Old Prices (Per pound)	New Prices (Per pound)	Savin (Pe poun
4-7/1	25.90c	22.69c	3.21
4-6/1	27.62	24.41	3.21
2-6/1	25.90	22.96	2.94
2-7/1	25.90	21.59	4.31
1-6/1	25.40	22.57	2.83
1/0-6/1	25.15	22.17	2.98
2/0-6/1	24.92	22.13	2.79
3/0-6/1	24.80	21.97	2.83
4/0-6/1	24.80	21.97	2.83
26/7			
266,800	29.05	26.15	2.90
336,400	27.88	24.96	2.92
397,500	27.27	24.33	2.94
477,000	26.66	23.80	2.86
636,000	25.90	23.05	2.85
715,500	24.75	22.87	1.88

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 18.50c, Conn. Valley, 18.62½c, Conn. Valley.

Brass Ingot: 85-5-5-5 (No. 115) 17.75-18.25c; 80-20 (No. 215) 26.25c; 80-10-10 (No. 305) 23.50c; No. 1 yellow (No. 405) 14.75-16.00c.

Zinc: Prime western 9.75c, brass special 10.00c, intermediate 10.25c, East St. Louis; grade 10.75c, delivered.

Lead: Common 12.55c; chemical, 12.65c; corroding, 12.65c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point.

Secondary Aluminum: Piston alloys 16.50-17.00c; No. 12 foundry alloy (No. 2 grade) 15.75-16.75c; stel deoxidizing grades, notch bar, granulated or shot: Grade 1, 18.25c; grade 2, 17.25c; grade 3, 16.25c; grade 4, 15.25c. Prices include freight at carload rate up to 75 cents per 100 lb.

Secondary titanium-aluminum alloy No. 1 (low Cu) 30.00c; No. 2 (2% Cu) 28.00c, f.o.b. Eddystone, Pa.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, f.o.b. Freeport, Texas.

Nickel: Grade A, prompt delivery, 92.50c; November arrival 92.00c; December arrival, 91.00c; January arrival, 90.00c. Chinese, 99% tin, prompt del., 84.00c; November arrival 83.00c. **CFC selling prices for prompt delivery, ex-dock New York or f.o.b. Texas City, Tex.: Grade A, 99.8% or higher (including Straits) 92.00c; Grade B, 99.8% or higher, not meeting specs. for Grade A, with 0.05% max. cobalt, 94.80c; Grade C, 99.65-99.79%, incl., 94.00c; Grade D, 99.5-99.649%, 94.40c; Grade E, 99.0-99.499%, 94.00c; Grade F, 98-98.999%, 93.00c; Grade G, 95-97.999%, 91.00c. Prices for grade D through Grade G are for tin content.**

Antimony: American 99-99.8% and over but not meeting specifications below, 32.00c; 99.8% or over (arsenic 0.05% max.; other impurities 0.1% max.) 32.50c; f.o.b. Laredo, Tex., bulk shipments. Foreign, 99% (Chinese, Polish, Belgium), prompt, 26.00c, New York.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.00c; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 42.00c. Prices include import duty.

Mercury: Open market, spot, New York $73-75 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.

Uranium: "Regular" straight or flat forms, 3-lb. lot; special or patented shapes, $2.15.

Cobalt: 97-98%, $1.80 per lb for 550 lb (keg); $1.82 per lb for 100 lb (case); $1.87 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 73.25c per oz.

Platinum: $69-72 per ounce.

Palladium: $24 per troy ounce.

Iridium: $100-$110 per troy ounce.

Tantalum (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

Base prices, cents per pound, f.o.b. mill; based on 18.50-cent copper.)

Sheet: Copper 32.18; yellow brass 28.69; commercial bronze, 95% 32.10; 90%, 31.61; red brass, 85%, 30.60; 80%, 30.12; best quality, 75%; nickel silver, 18%, 42.27; phosphor-bronze, grade A, 5% 50.90.

Rods: Copper, hot-rolled 28.03; cold-drawn 30.25; yellow brass free cutting, 23.19; commercial bronze, 95% 31.79; 90% 31.30; red brass 85% 30.29; 80% 29.81.

Seamless Tubing: Copper 32.22; yellow brass 33.10; commercial bronze 90% 34.27; red brass 85% 33.51; 80% 33.03.

Wire: Yellow brass 28.98; commercial bronze, 95% 32.39; 90% 31.90; red brass, 85% 30.89; 80% 30.41; best quality brass 29.87.

Copper Wire: Bare soft, f.o.b., eastern mills, 30,000 lb lots 23.30 l.c.l. 23.925, c.l. 23.425; weatherproof, f.o.b. eastern mills, 100,000 lb lots 25.35, l.c.l. 26.10, c.l. 25.60; magnet, enameled, c.l. 28.50, 15,000 lb or more 28.75, l.c.l. 29.25.

ALUMINUM

Sheets and Circles: 2s and 3s mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-24	36.8	33.4	39.5
0.008-0.0075	12-24	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	—Hexagonal— R317-T4	—Hexagonal— 17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	...	36.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, $17.75 per cwt; add 50c per cwt, 10 sq ft to 140 sq ft. Pipe: Full coils, $17.75 per cwt. Traps and bends: List price plus 48%.

ZINC

Sheets, 15.50c f.o.b. mill, 36,000 lb and over. Ribbon zinc in coils, 15.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 14.00c; over 12-in., 15.00c.

NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c. Seamless tubes, 80.00c. Shot and blocks, 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb, 35.00-36.00c.

DAILY PRICE RECORD

'49	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
N. 15-17	18.50	12.55	9.75	92.50	17.00	32.00	40.00	73.25
14	18.50	12.60	9.75	92.00	17.00	32.00	40.00	73.25
12	18.50	12.60	9.75-10.00	93.50	17.00	32.00	40.00	73.25
10	18.50	12.60	9.75-10.00	93.50	17.00	32.00	40.00	73.25
9	18.50	12.80	10.00	94.50	17.00	32.00	40.00	73.25
7-8	18.50	12.80	9.75	94.50	17.00	32.00	40.00	73.25
3-5	18.50	12.80	9.75	94.00	17.00	32.00	40.00	73.25
1-2	17.625	12.80	9.75	94.00	17.00	32.00	40.00	73.25
Avg.	17.625	13.242	9.317	95.505	17.00	32.00	40.00	73.25

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del, New York; Aluminum, primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 25.50c; 5 tons and over 26.00c; 1 to 5 tons, 26.50c; less than 1 ton, 27.00c.

Copper Anodes: Base, 2000 to 5000 lb; f.o.b. shipping point, freight allowed; Flat untrimmed 28.84c; oval 28.34c; cast 26.87c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 45.00c f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 18.00c; 1000 to 19,000 lb, 17.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 25.25c; over 250 lb, 24.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 10 lb, 64.00c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 26.50c; 400-lb bbl, 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, 111.00c, 500 to 999 lb, 111.50c; 200 to 499 lb. 112.00c; less than 2090 lb, 113.50c; ball, 1000 lb and over, 113.25c; 500 to 999 lb, 113.75c; 200 to 499 lb. 114.25c; less than 200 lb, 115.75c f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 67.9c; 100 or 300 lb drums only, 100 to 500 lb, 59.7c; 600 to 1900 lb, 57.3c; 2000 to 9900 lb, 55.5c, f.o.b. Sewaren, N. J. On 100 or 350 lb drums only, 100 to 600 lb 59.7c; 600 to 1900 lb, 57.3c; 2000 to 9900 lb, 55.5c; 10,000 lb and over, 54.4c, f.o.b. Carteret, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100-lb drums 38.00c, f.o.b. Niagara Falls, N. Y.; 40.50c, f.o.b. Cleveland; 39.25c, del., Detroit and Philadelphia.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb 96.00c; more than 2000 lb, 94.00c, f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, 83.00c; 100 lb kegs 84.00c, f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	15.50	15.50	14.75
Yellow brass	12.50	12.25	11.37½
Commercial Bronze			
95%	14.50	14.25	13.75
90%	14.25	14.00	13.50
Red brass			
85%	14.00	13.75	13.25
80%	13.62½	13.37½	12.87½
Best Quality (71-80%)	13.37½	13.12½	12.62½
Muntz Metal	11.50	11.25	10.75
Nickel, silver, 10%	14.50	14.25	7.25
Phos. bronze, A	16.75	16.50	15.50
Naval brass	12.00	11.75	11.25
Manganese bronze	12.00	11.75	11.12½

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 15.25; No. 2 copper 14.25; light copper 13.25; composition red brass 13.50; radiators 10.00-10.25; heavy yellow brass 10.00.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 15.25; No. 2 copper 14.25; light copper 13.25; refinery brass (60% copper) per dry copper content 13.25-13.50; radiators 10.00.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and Brass: Heavy copper and wire No. 1 13.50-13.75; No. 2 12.50-12.75; light copper 11.50-11.75; No. 1 composition red brass 11.25-11.50; No. 1 composition turnings 10.75-11.00; mixed brass turnings 6.75-7.00; new brass clippings 10.50-11.00; No. 1 brass rod turnings 9.25-9.50; light brass 6.50-6.75; heavy yellow brass 7.75-8.00; new brass rod ends 9.75-10.00; auto radiators, unsweated 8.75-9.00; cocks and faucets, 9.25-9.50; brass pipe 9.75-10.00.

Lead: Heavy 9.50-9.75, battery plates 5.00-5.25; linotype and stereotype 10.00-10.25; electrotype 9.00-9.25; mixed babbitt 9.75-10.00.

Zinc: Old zinc 4.25-4.75; new die cast scrap 4.00-4.50; old die cast scrap 3.00-3.25.

Tin: No. 1 pewter 48.00-50.00, block tin pipe 70.00-72.00, No. 1 babbitt 36.00-38.00.

Aluminum: Clippings 2S 10.50-11.00; old sheets 7.50-8.00, crankcase 7.50-8.00, borings and turnings 3.00-3.50.

IRON AND STEEL SCRAP

Consumer prices, except as otherwise noted, including brokers' commissions, as reported to STEEL, Nov. 17, 1949; gross tons except as n
Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Nov. 17	$30.00
Nov. 10	28.00
Oct. 1949	26.71
Nov. 1948	43.25
Nov. 1944	16.40

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 Heavy Melt.	*$33.00*
No. 2 Heavy Melt.	*31.00*
No. 1 Busheling	*33.00*
No. 1 Bundles	*33.00*
No. 2 Bundles	*27.00*
No. 3 Bundles	*25.00*
Heavy Turnings	*24.50-25.00*
Machine Shop Turnings	*22.50-23.00†*
Mixed Borings, Turnings	*23.50-24.00*
Short Shovel Turnings	*25.00-26.00*
Cast Iron Borings	*22.50-23.00*
Low Phos. Steel	*35.50-36.50*

Cast Iron Grades*

No. 1 Cupola Cast	37.00-38.00
No. 1 Machinery Cast.	39.00-40.00
Charging Box Cast	31.00-32.00
Heavy Breakable Cast.	28.00-29.00

Railroad Scrap*

No. 1 R.R. Heavy Melt.	*33.50-34.00*
Axles	*36.00-37.00*
Rails, Random Length	*35.00-36.00*
Rails, 2 ft and under	*39.00-40.00*
Rails, 18 in. and under	*40.00-41.00*
Railroad Specialties	*33.00-34.00*
Angles, Splice Bars	*32.50-33.50*

* Nominal.
† Crushers' buying prices.

CLEVELAND

No. 1 Heavy Melt. Steel	$30.00-30.50
No. 2 Heavy Melt. Steel	30.00-30.50
No. 1 Busheling	30.00-30.50
No. 1 Bundles	30.00-30.50
No. 2 Bundles	23.50
Machine Shop Turnings	19.00
Mixed Borings, Turnings	20.00†
Short Shovel Turnings.	20.00†
Cast Iron Borings	20.00†
Bar Crops and Plate	32.00-32.50
Punchings & Plate Scrap	32.00-32.50
Cut Structurals	32.00-32.50

† Nominal.

Cast Iron Grades

No. 1 Cupola	44.00-45.00
Charging Box Cast	37.00-38.00
Stove Plate	38.00-39.00
Heavy Breakable Cast.	35.00-36.00
Unstripped Motor Blocks	32.50-33.50
Brake Shoes	31.00-32.00
Clean Auto Cast	45.00-46.00
No. 1 Wheels	39.00-40.00
Burnt Cast	33.00-34.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	33.00-34.00
R.R. Malleable	38.50-39.00
Rails, 3 ft and under	43.00-44.00
Rails, Random Lengths	38.00-39.00
Cast Steel	35.00-36.00
Railroad Specialties	35.00-36.00
Uncut Tires	35.00-36.00
Angles, Splice Bars	41.00-42.00

VALLEY

No. 1 Heavy Melt. Steel	$32.50-33.00
No. 2 Heavy Melt. Steel	30.50-31.00
No. 1 Bundles	32.50-33.00
No. 2 Bundles	25.00-25.50
Machine Shop Turnings	22.50-23.00
Short Shovel Turnings.	24.50-25.00
Cast Iron Borings	23.50-24.00
Low Phos.	31.00-31.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	33.00-34.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	*$26.00-27.00*
No. 2 Heavy Melt. Steel	*24.50*
No. 1 Busheling	*24.50*
No. 1 Bundles	*26.00-27.00*
No. 2 Bundles	*23.50*
Machine Shop Turnings	*17.00-18.00*
Short Shovel Turnings.	18.00
Mixed Borings, Turnings	16.00
Bar Crop and Plate	*28.00*
Punchings & Plate Scrap	*28.00*
Cut Structurals	*27.00-28.00*
Elec. Furnace Bundles	*26.00-27.00*
Heavy Turnings	*26.00-27.00*
No. 1 Chemical Borings	27.00-28.00

Cast Iron Grades

No. 1 Cupola Cast	*35.00-36.00*
No. 1 Machinery Cast.	38.00-39.00
Charging Box Cast	35.00-36.00
Heavy Breakable Cast.	35.00-36.00
Unstripped Motor Blocks	30.00
Clean Auto Cast	38.00-39.00
No. 1 Wheels	*38.00-39.00*
Malleable	39.00

CINCINNATI

No. 1 Heavy Melt. Steel	*$30.00*
No. 2 Heavy Melt. Steel	*27.00*
No. 1 Busheling	*29.00*
No. 1 Bundles	*30.00*
No. 2 Bundles	*24.00*
Machine Shop Turnings	*17.00*
Short Shovel Turnings	*20.00*
Mixed Borings, Turnings	*18.00*
Cast Iron Borings	*20.00*

Cast Iron Grades

No. 1 Cupola Cast	*42.00*
Charging Box Cast	*33.00*
Heavy Breakable Cast.	*35.00*
Stove Plate	*32.00*
Unstripped Motor Blocks	*22.00*
Brake Shoes	*24.00*
Clean Auto Cast	*42.00*
Drop Broken Cast	45.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	*32.00*
R.R. Malleable	*35.00*
Rails, Rerolling	*40.00*
Rails, Random Length	*37.00*
Rails, 18 in. and under	*45.00*

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	*$23.00-24.00*
No. 1 Bundles	*27.00-28.00*
No. 2 Bundles	*23.00-24.00*
No. 1 Busheling	*27.00-28.00*
Machine Shop Turnings	*17.50-18.50*
Mixed Borings, Turnings	*17.50-18.50*
Short Shovel Turnings	*19.50-20.50*
Cast Iron Borings	*19.50-20.50*
Punchings & Plate Scrap	*27.00-28.00*

Cast Iron Grades

No. 1 Cupola Cast	34.00-35.00
Heavy Breakable Cast.	30.00-31.00
Clean Auto Cast	34.00-35.00

BUFFALO

No. 1 Heavy Melt. Steel	*$29.50-30.00*
No. 2 Heavy Melt. Steel	*27.50-28.00*
No. 1 Bushelings	*27.50-28.00*
No. 1 Bundles	*28.50-29.00*
No. 2 Bundles	*25.50-26.00*
Machine Shop Turnings	*20.00-20.50*
Mixed Borings, Turnings	*21.00-21.50*
Cast Iron Borings	*21.00-21.50*
Short Shovelings	*22.50-23.00*
Low Phos.	*31.50-32.00*

Cast Iron Grades

No. 1 Machinery	37.50-38.00
No. 1 Cupola	36.50-37.00
Mixed Yard	35.50-36.00
Malleable	34.50-35.00

Railroad Scrap

Rails, 2 ft. and under	*38.00-39.00*
Scrap rails	*35.00-36.00*
Specialties	*35.00-36.00*
No. 1 car wheels	*36.00-37.00*

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	*$23.00-24.00*
No. 2 Heavy Melt. Steel	*20.00-21.00*
No. 1 Busheling	*20.00-21.00*
No. 1 Bundles	*23.00-24.00*
No. 2 Bundles	*19.00*
Machine Shop Turnings	11.00-12.00
Mixed Borings, Turnings	11.00-12.00
Short Shovel Turnings.	11.00-12.00
Punchings & Plate Scrap	23.00-24.00
Cut Structurals	23.00-24.00
Elec. Furnace Bundles.	23.00-24.00

Cast Iron Grades

No. 1 Cupola Cast	29.00-30.00
No. 1 Machinery	31.00-32.00
Charging Box Cast	25.00-26.00
Heavy Breakable	25.00-26.00
Unstripped Motor Blocks	26.00
Malleable	36.00

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	*$21.00-22.00*
No. 2 Heavy Melt. Steel	*18.50-19.00*
No. 1 Bundles	*21.00-22.00*
No. 1 Busheling	*18.50-19.00*
Machine Shop Turnings.	*13.00-13.50*
Mixed Borings, Turnings	*13.00-13.50*
Short Shovel Turnings	*15.00-16.00*
Bar Crops and Plate	*23.00-24.00*
Punchings & Plate Scrap	*23.00-24.00*
Chemical Borings	19.00-19.50

Cast Iron Grades

No. 1 Cupola Cast	30.00-31.00
Mixed Cast	27.00-28.00
Heavy Breakable Cast.	28.00-29.00
Stove Plate	24.00-25.00
Unstripped Motor Blocks	20.00-21.00

CHICAGO

No. 1 Heavy Melt. Steel	*$30.00-31.00**
No. 2 Heavy Melt. Steel	28.00-29.00
No. 1 Bundles	*30.00-31.00**
No. 2 Bundles	26.00-27.00
No. 3 Bundles	18.00-19.00
Machine Shop Turnings	21.00-22.00
Mixed Borings, Turnings	21.00-22.00
Short Shovel Turnings.	22.00-23.00
Cast Iron Borings	20.00-21.00
Bar Crops and Plate	29.00-31.00
Punchings	29.00-31.00
Elec. Furnace Bundles.	29.00-30.00
Heavy Turnings	24.00-25.00
Cut Structurals	30.00-31.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-43.00
Clean Auto Cast	42.00-43.00
No. 1 Wheels	*34.50-35.50*
Stove Plate	33.00-34.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	33.00-34.00
Malleable	37.00-38.00
Rails, Rerolling	44.00-45.00
Rails, Random Lengths	39.00-40.00
Rails, 2 ft. and under.	42.00-43.00
Rails, 18 in. and under	43.00-44.00
Railroad Specialties	35.00-36.00
Angles, Splice Bars	36.00-37.00

* Nominal.

BIRMINGHAM

No. 1 Heavy Melt. Steel	$25.00
No. 2 Heavy Melt. Steel	24.50
No. 1 Busheling	24.00
No. 2 Bundles	22.00
Machine Shop Turnings	15.00
Mixed Borings, Turnings	15.00
Short Shovel Turnings.	19.00
Cast Iron Borings	18.00
Bar Crops and Plate	30.00
Cut Structurals	23.00

Cast Iron Grades

No. 1 Cupola Cast	34.00-35.00
Stove Plate	28.00-30.00
No. 1 Wheels	23.00-24.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	28.00
R. R. Malleable	nominal
Rails, Rerolling	37.00
Rails 3 ft. and under	25.00-26.00
Angles and Splice Bars	31.00-33.00

ST. LOUIS

No. 1 Heavy Melt. Steel	*$31.00-*
No. 2 Heavy Melt. Steel	*26.00-*
Machine Shop Turnings	19.00-
Short Shovel Turnings.	21.00-

Cast Iron Grades

No. 1 Cupola Cast	37.00-
Charging Box Cast	34.00-
Heavy Breakable Cast.	32.00-
Brake Shoes	32.00-
Clean Auto Cast	40.00-
Burnt Cast	32.00-

Railroad Scrap

R.R. Malleable	31.00-
Rails, Rerolling	40.00-
Rails, Random Lengths	36.00-
Rails, 3 ft. and under.	37.00-
Uncut Tires	29.00-
Angles, Splice Bars	37.00-
Railroad Specialties	33.00-

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$
No. 2 Heavy Melt. Steel	
Nos. 1 & 2 Bundles	

Cast Iron Grades

No. 1 Cupola Cast	23.00-

Railroad Scrap

No. 1 R.R. Heavy Melt.	
Wheels	
Rails, Random Lengths	

SEATTLE

No. 1 Heavy Melt. Steel	$
No. 2 Heavy Melt. Steel	
No. 1 Busheling	
Nos. 1 & 2 Bundles	
No. 3 Bundles	
Machine Shop Turnings	
Mixed Borings, Turnings	
Punchings & Plate Scrap	
Cut Structurals	
Elec. Furnace Bundles.	

Cast Iron Grades

No. 1 Cupola Cast	25.00-
Heavy Breakable Cast.	
Stove Plate	
Unstripped Motor Blocks	
Malleable	
Brake Shoes	
Clean Auto Cast	
No. 1 Wheels	

Railroad Scrap

No. 1 R.R. Heavy Melt.	
Railroad Malleable	
Rails, Random Lengths	
Angles and Splice Bars	

LOS ANGELES

(F.o.b. car, Los Angeles)

No. 1 Heavy Melt. Steel	$
No. 2 Heavy Melt. Steel	
Nos. 1 & 2 Bundles	
No. 3 Bundles	
Machine Shop Turnings	
Mixed Borings, Turnings	
Punchings & Plate Scrap	
Electric Furnace Bundles	

Cast Iron Grades

No. 1 Cupola Cast	$

Railroad Scrap

No. 1 R.R. Heavy Melt.	
Rails, Rerolling	

HAMILTON, ONT.

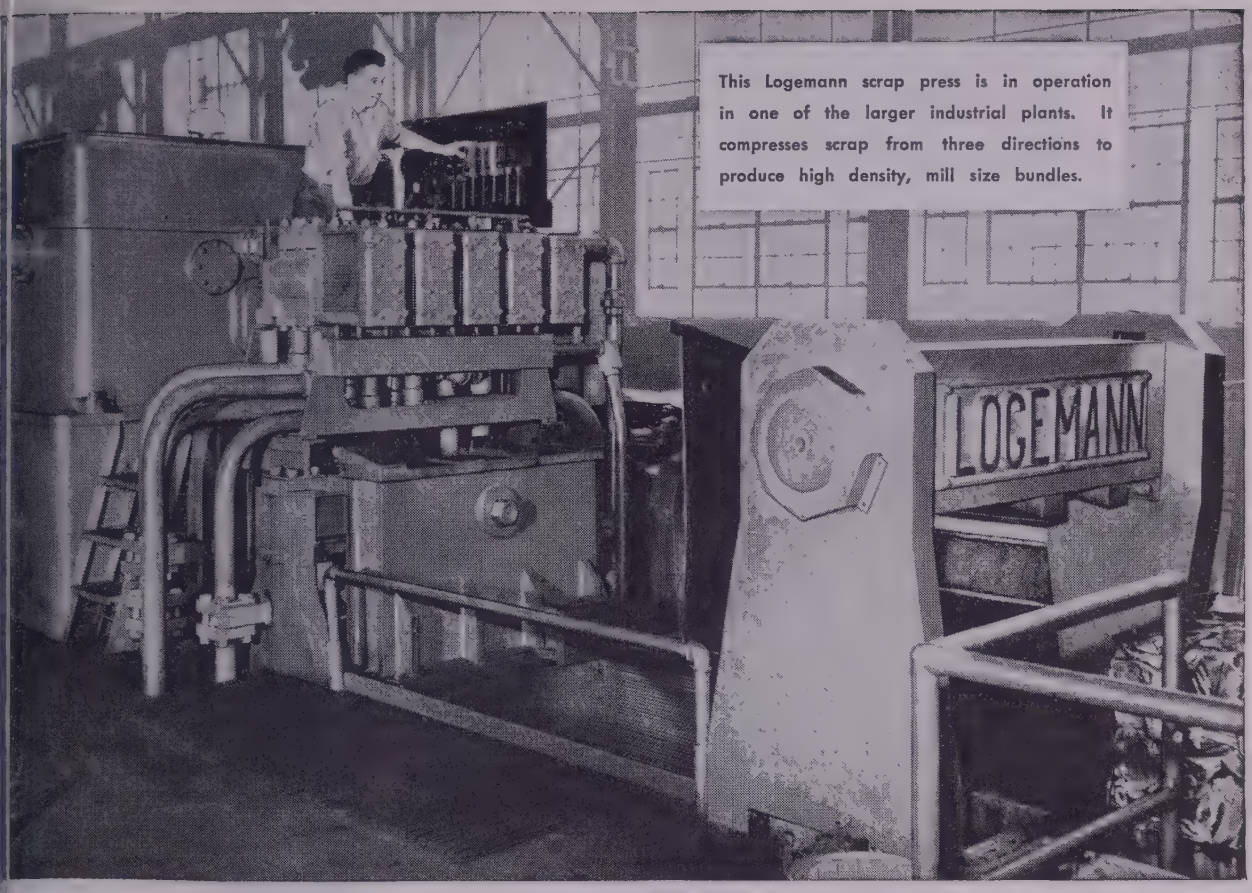
(Delivered prices)

Heavy Melt.	$
No. 1 Bundles	
Mechanical Bundles	
Mixed Steel Scrap	
Mixed Borings, Turnings	
Rails, Remelting	
Rails, Rerolling	
Busheling	
Bushelings new factory, prep'd	
Bushelings new factory, unprep'd	
Short Steel Turnings	

Cast Iron Grades*

Cast	40.00-

* Removed from price co
Aug. 9, 1947; quoted on bas
f.o.b. shipping point.



This Logemann scrap press is in operation in one of the larger industrial plants. It compresses scrap from three directions to produce high density, mill size bundles.

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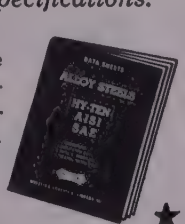

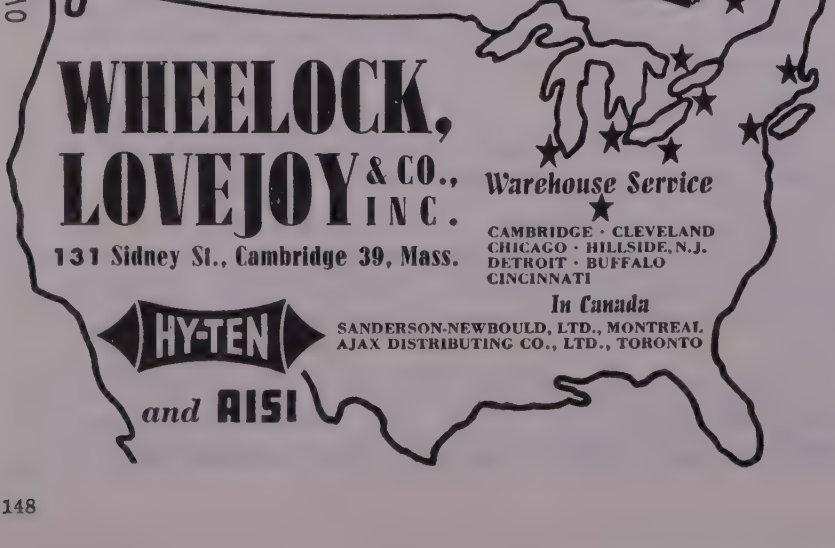

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HY-TEN *and* AISI

Sheets Strip . . .

Sheet and Strip Prices, Page 139 & 140 & 1

Cleveland—With order backlo heavy, reactivated sheet and st mills are under pressure for deli eries. Tonnage on books is suf cient to support active operatio through second quarter, but the is the possibility some orders m be canceled once the supply ou look is clarified. Cold-rolled and g vanized shipments are most extend and consumer quotas likely will applied until the situation eases. D velopments in the automotive indu try hold the key to general dema over coming months. Fabricati curtailments likely will continue be experienced over the next seve weeks, since it will take mills th long to regain pre-strike shippi schedules. The prevailing view the market is that a first quart price advance depends upon compe tive conditions. Cost of the welfa package granted steelworkers is es mated at $3 to $4 per ton, but does not necessarily follow the add cost burden will be passed along consumers. In fact, actual cost d termination remains to be made.

New York — Sheet deliveries a most extended of major produc except pipe. Several leading pr ducers are booked throughout t first quarter; one practically throu first half. This applies to ma grades, such as hot and cold-roll sheets and galvanized. There is po sibility of some cancellations lat as some consumers placed more o ders prior to the strike than th now require.

Sheet buying likely will not as heavy after a few weeks as it w throughout the greater part of th year, when there was much protecti buying. Many buyers will be co tent with building up a working i ventory because steel labor distur ances likely will not develop for sor months to come.

One leading sheet producer has r opened books for first quarter, th being the exception to the gene rule. In this case, three of its un were still on strike as the past we got under way, with little possibil of getting into full operation for while, even assuming an early sett ment of the dispute.

On specialties, such as stainle steel sheets, little tonnage remai for shipment against new orders b fore early January.

Boston—Carbon sheet order bac logs extend through first quart with distribution of tonnage bei made under varied forms of alloc tion as rescheduling progresses. To nage on books at time of suspensio is reaching consumers, but so sheet orders originally booked f fourth quarter will go into the fir Pressure for delivery against fi rolled is heavy, but little tonnage being booked for shipment beyo Apr. 1. Cold strip production, a proaching pre-strike levels, w bridge gaps on consumer shorta which will not develop to exte likely in sheets, due to sustained o put by considerable cold strip ca city. Converters are gradually taining balance in hot-rolled inv tories.

Some eastern producers ha

rked up stainless strip 25 cents
100 pounds.

Philadelphia—Sheet sellers have
le to offer for shipment against
w orders before the end of the first
arter and some are sold up beyond
t. One midwestern producer has
as yet opened books for first
arter, due to continued labor dis-
tions at certain units.
Stove requirements continue press-
and one large manufacturer of
rigerators for the first time in
te a while is issuing releases.

Pittsburgh—Producers have estab-
ned monthly allotments for dis-
bution of sheets by district offices
basis of estimated production.
me sellers were able to commence
ling schedules last week on pre-
usly semi-processed material. Most
erests estimate it will be another
o weeks before full production can
achieved. Delivery promises on
w orders fall within the following
neral pattern: Galvanized sheets,
ur months; enameling, three
nths; plain hot-rolled pickled
eets and strip, two to three months;
icon sheets and strip, two months.
me nonintegrated cold-rolled strip
oducers remained idle last week
e to depleted stocks of hot-rolled
terial. Some interests have been
ked to convert tonnage supplied by
stomers. A renewal of ingot con-
rsion pattern also is noted among
tegrated steel producers.

Cincinnati—Sheet production is
inting upward. Heavy carryover
dicates tight supply in first quar-
r, complicating scheduling. Ration-
g may be invoked until distribu-
n tangles get straightened out.

Chicago—Practically all of first
lf has been written off by the
lls in accepting new sheet busi-
ss. Reappearance of conversion
als, gray market operations and
aps indicates shortages are here.

St. Louis — Sheet demand has
ked up from consumer fear of a
e to six month scarcity. Virtually
out-of-state business was ac-
pted here during the shutdown.
evertheless, books are filled through
arch and no announcement has been
ade when second quarter books will
opened.

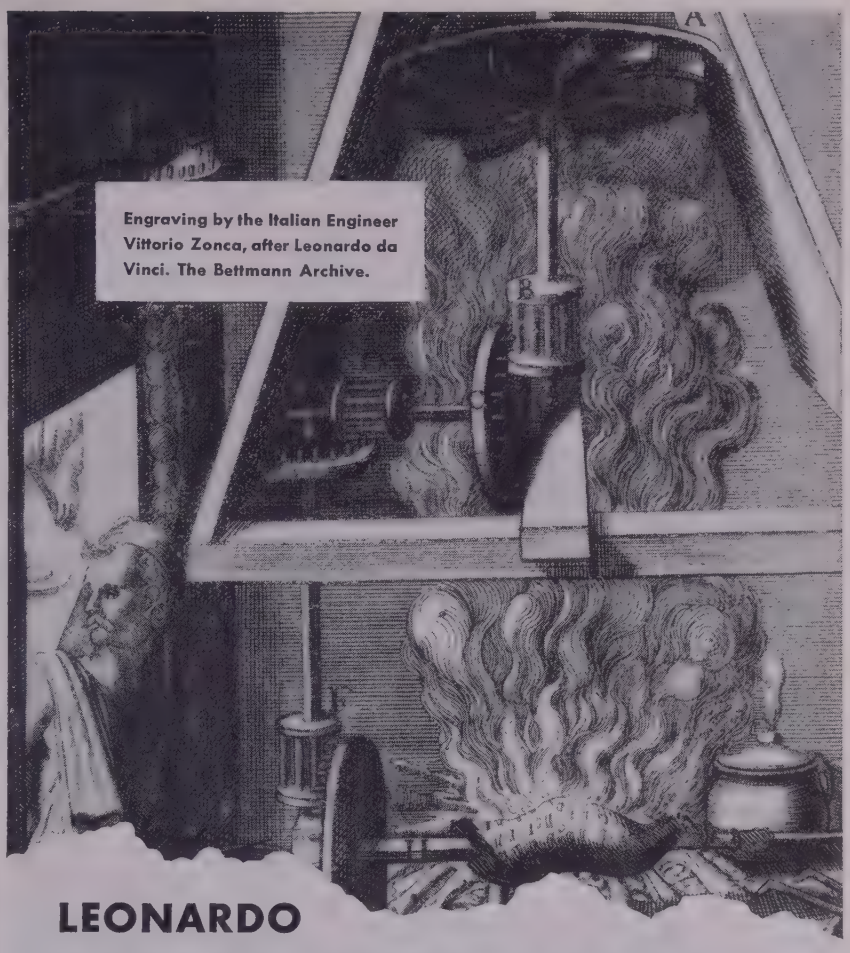
San Francisco—Strike settlements
ve encouraged users of flat-rolled
oducts, but most fabricators pre-
t tight supplies for several months.
eavy demand is expected indefinite-
Sheet inventories have been
arply reduced, in some cases be-
g sufficient to carry operations only
rough November.

Los Angeles—Shortages of flat-
lled products are expected through
st quarter. Unbalanced inventories
ll continue to handicap fabricators
r months.

einforcing Bars . . .

Reinforcing Bar Prices, Page 139

Los Angeles—Fabricators' rein-
rcing supplies are low. Limited
iginal stocks were depleted in many
stances during the strike by strong
mand. Smaller sizes, particularly,
e noticeably scarce. Concrete con-
ruction is being maintained at a



Engraving by the Italian Engineer Vittorio Zonca, after Leonardo da Vinci. The Bettmann Archive.

LEONARDO

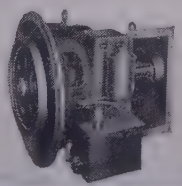
COOKED WITH SMOKE...

The principle of the "fluid drive," modern as it may seem to be, goes back a long, long way. Leonardo da Vinci, an early student of power transmission, conceived the idea of utilizing the smoke and steam created by the cooking process to drive a primitive turbine and cause a spit to revolve automatically.

Leonardo's purpose was commendable... his solution impractical. Today, the principle of hydraulic power transmission continues to intrigue inquiring minds. And the Twin Disc Clutch Company takes pride in providing practical answers to the power transmission problems of leading equipment manufacturers.

Wherever power must be applied... in all types of construction, lumber, petroleum and farm equipment and in the marine and machine tool fields... there is a Twin Disc product that will handle the job. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

Hydraulic Torque Converter



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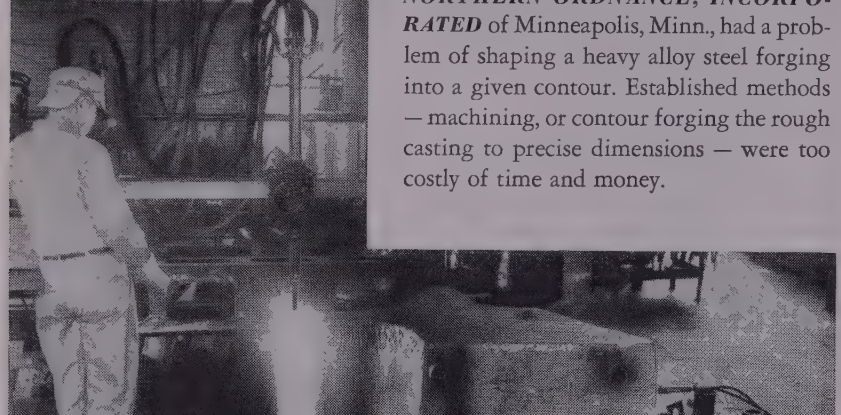

NORTHERN ORDNANCE, INCORPORATED of Minneapolis, Minn., had a problem of shaping a heavy alloy steel forging into a given contour. Established methods — machining, or contour forging the rough casting to precise dimensions — were too costly of time and money.

A. P. Demmer and R. F. Helmkamp, Airco Technical Sales Representatives, recommended oxyacetylene machine cutting the rough forging, using an Airco No. 6A Oxygraph.

Since the forging was about 70" long and 28" thick, weighing almost 7 tons, it was necessary to build special cutting support jigs — one for each cutting requirement. Further, to handle the many cutting positions, the Oxygraph had to be raised 4' off the floor.

The operation was highly successful. The shape cutting technique proved extremely economical and fast, and the company was highly pleased with both the technical aid furnished and the results obtained.

• • • •

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fast pace. One supplier of materia last month lacked manpower to h on more than one-third of availab jobs.

Seattle—Northwest Steel Rollin Mills Inc., this city, is operating capacity following a ten-day repa shutdown. The rolling mill is on four-day basis. Bethlehem's loc plant shortly will be at capacity.

Steel Bars . . .

Bar Prices, Page 139

New York—Although most mi have been down six weeks, the situ tion in hot-carbon bars is only fair stringent. Shipments are beginni to flow in good volume against o orders and promises against new o ders are not extended much mo than five to eight weeks. There lik ly will be little in the way of a rearages by the end of this yea Most sellers see relatively good bus ness ahead throughout the first qua ter, but doubt if there will be an important lack of balance in supp and demand.

Cold-drawn carbon bar deliveri vary; some drawers promise delive on a wide range of sizes within month; others, especially those clos by strike, will not be able to do mu against new orders before the midd of January. Much depends upo position of sellers with regard hot stock. Certain cold drawer who were not affected by strikes their own shops, were able to can on with little difficulty and even t day are able to make fairly goo deliveries on a number of sizes.

Hot alloy bars are available f shipment against new orders with four to six weeks; cold alloy ba shipments are a little more extende

Boston—Carbon steel bar orde can be placed for January deliver although shipment varies with r sumption of production by mill Carryover on bars will be less tha that for some other standard carbo products, notably flat-rolled. Whi some protective orders were release bar consumers have managed thu far to maintain operations and add tional volume is now being delivere There is some slackening in ne buying.

Philadelphia—Fairly active deman prevails in carbon bars, as consumer endeavor to increase inventories Overall supply is not as stringen however, as was thought might h likely at this time, some producer being able to make deliveries against new orders within a month or s Most sellers expect to be fairly we caught up on arrearages by the en of this year. The absence of railroa buying is being appreciably felt. Con sumers of cold carbon bars are havin little difficulty in obtaining speci fications within a period of three t four weeks, although shopping aroun is necessary in some instances. Con sumers of hot and cold alloy bars ar being promised late December an early January delivery.

Pittsburgh—With two exception all cold finishers here resumed oper ations last week. Columbia Steel & Shafting continued to operate follow ing termination of contract abou mid-October, but was forced to shu down because of depleted hot-rolle stocks. This interest does not an

pate mill shipments in sufficient ntity to achieve balanced stocks resumption of operations until ly next month. Moltrup Steel ducts Co. also was idle at mid- k. Those interests that were idled 1 started shipping within 24 to hours after strike termination. ere is no uniform pattern in respect order backlogs, which are ex- ded six to eight weeks among se companies that must await mill pments of hot-rolled material; un- two weeks from those cold fin- ers whose stocks are in balance.

Cleveland—Substantial carbon bar siness will be carried into first arter by producers, but the supply look is much more comfortable an that in light flat-rolled products. roughout the strike, mills booked r tonnage which was substantial en in alloy bars. Some of this ton- ge may prove of a protective ture and it will not surprise the lls if some cancellations are re- ved. Cold-finished bar production d up well throughout the strike, t cold-drawers cut deeply into their t bar stocks and it may be some eks before they are able to re- nish their inventories.

Chicago—Delivery on hot carbon r orders placed now is promised February or later at most mills. proximately this same situation evails for alloy material. Some dis- ct forgers managed to pick up ough steel immediately before and ring the strike to maintain produc- n at a fairly normal rate, but ink lag in receipt of now-scheduled el may adversely affect them later.

ubular Goods . . .

Tubular Goods Prices, Page 142

Boston — Demand for merchant eel pipe is lower, although distribu- rs' stocks are small and more un- lanced. Apparently, distributors ve moved inventories along to con- ming channels and immediate re- irements from those groups are wer. Some producers took no pipe ders during the strike, while others ho did are now having them sched- ed for January and February. Pres- re for pipe shipments has been sur- isingly light.

Pittsburgh—Tubing producers or- r backlogs extend four to six weeks r pressure and mechanical tubing, th deliveries for larger sizes most tended. Demand for pressure tub- g from distributors' stocks was not s great as anticipated during the rike. In contrast, mechanical tub- g was in heavy demand. There little distinction in order back- gs between carbon, stainless and al- y tubing. Backlogs of standard uttweld pipe represent two months' roduction; seamless, four to five onths. Deliveries on oil country oods are extended two months. All ipe producers here with exception Spang Chalfant, have resumed op- ations.

Los Angeles—Pipe demand is sus- ained with one producer of small iameters booked through first quar- r. Strongest demand is for pipe in he ½-in. to 2-in. range, with the tility and construction industries rrently the dominant factors.

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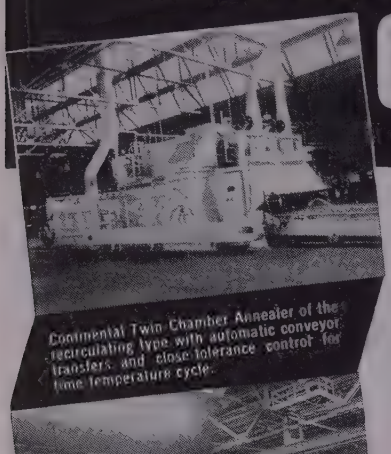

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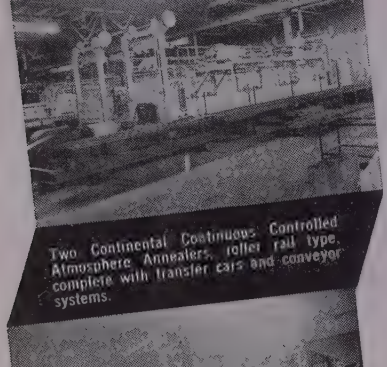

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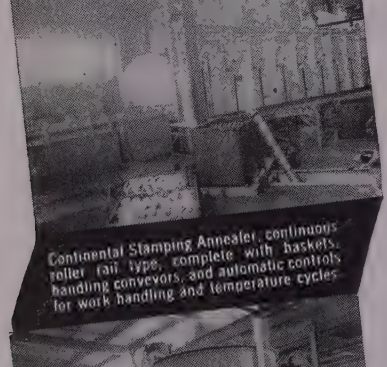

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Plates . . .

Plate Prices, Page 139

Philadelphia—With all district pla mills back in operation, production being stepped up rapidly. As n demand is slack, output may tap within the next few weeks, on present arrearages have been work off. One district mill has resum operations with almost twice t open-hearth production that prevail prior to the steel strike.

One encouraging phase is a spu in jobber demand, distributors e deavoring to get plate stocks ba into balance.

Boston—Volume of plate tonna placed for first quarter delivery small. While some tonnage on ord from the Pittsburgh district is behi schedule, eastern Pennsylvania pr ducers can take new commitments f shipment before Jan. 1. Dema is chiefly for lighter gages for sm tanks. Floor plate volume is stea with deliveries three to five weeks heavier gages. While suspensio brought no serious shortages plates, strikes have widened delive ranges to temporary disadvantage Pittsburgh.

New York—Plate mill producti in the East is rapidly approachi prestrike levels. With the stri at the Worth Steel Co., Claymor Del., settled, all eastern plate mi are producing and in practically cases they are offering tonna against new orders for delivery b fore the end of this year. Plate d mand is still sluggish.

Chicago—Plates are not an ite of concern in the steel scarci period getting under way. One m here is not including plates in i allocation plan, but admits that Ap is the earliest delivery on new a counts.

Los Angeles—Pressure for fir quarter plate deliveries has ease Kaiser Steel is booked through Ja uary on heavier gages. Company new mill for light gage plate is e pected to be in operation early 1950.

San Francisco—Supplies of plate especially light gages, are not ple tiful, but improvement is expecte with the strike about settled.

Seattle—Sizable plate tonnages a pending for McNary dam and oth public works, but small shops repo business slow and operations cu tailed. No important projects invol ing plates are up for bids.

Wire . . .

Wire Prices, Pages 141 & 142

Chicago — Despite the output several independent wire makers this area throughout the strike, d mand pressure on all mills is e tremely heavy. Spring wire, soug by furniture and automotive account and annealed wire for screw man facturers are especially scarce, i ventories having been seriously d pleted during the strike. Some no integrated mills expect to operate full capacity well beyond first qua ter. The trend toward inventor reduction was completely revers before the steel strike started. Th upward trend, coupled with pent demand resulting from the strik spells tightness for most wire pro ucts for months.

tructural Shapes . . .

Structural Shape Prices, Page 139

Philadelphia—Structural demand is ore active. Most fabricators believe iat backlogs may be stepped up iarply after the turn of the year. :andard shapes are available within ur to five weeks; wide flange sec- ons, at around six to eight weeks. he Phoenixville, Pa., producer of andard shapes was scheduled to t its smaller mill into operation ound the latter part of last week. he larger mill is undergoing repairs, cluding new foundation work, and ay not get going for another three four weeks. The company is bring- g in semi-finished from a district ill to meet curent operations.

Award of the 35,000-ton super- ructure for the Chesapeake Bay idge at Baltimore has been formally aced with Bethlehem Steel Co.

About $15 million worth of bonds ill be issued Dec. 1 as the beginning a program for financing the huylkill Expressway from Prince of russia to the Philadelphia city nits and several other large proj- ts.

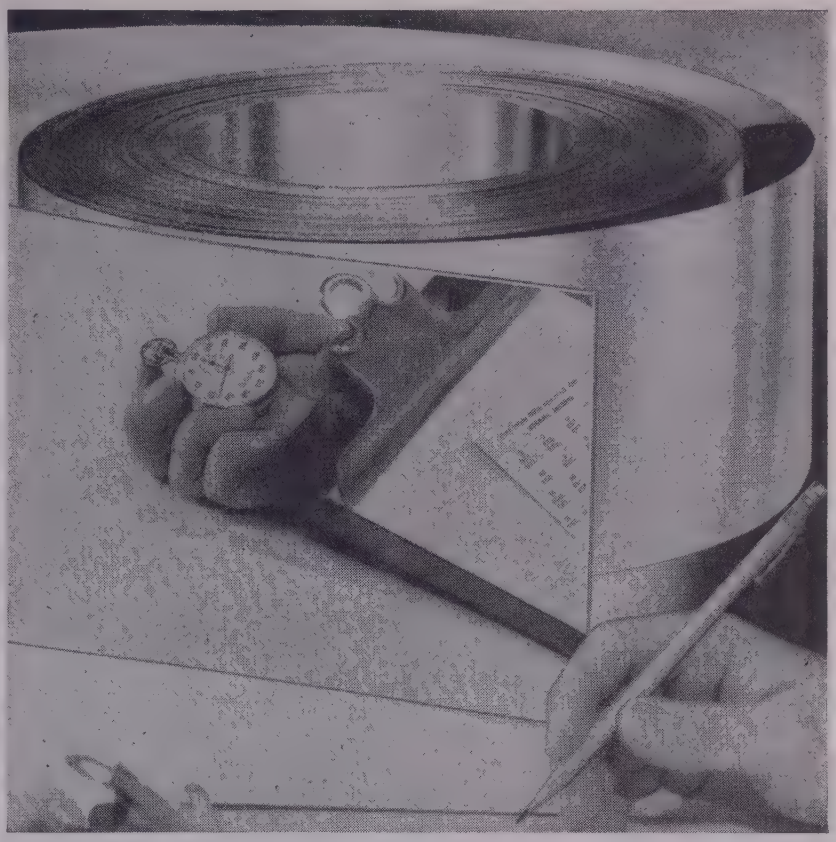
Boston—That backlogs with dis- ict structural shops are lower is dicated by an increase in number estimates on public work contracts king larger individual tonnages. ackening in small-tonnage private ilding continues and one district op booked a 380-ton welded de- gn bridge. With plain material now ming in against old orders and llings scheduled for four to five eeks delivery on standard shapes bricating shops went through strike riod without serious shortages, al- ough wide flanged beams are ex- nded beyond standard material. ew contracts for fabricated work pproximate 2000 tons while inquiry led by 1450 tons, rebuilding Sulli- n Square structure, Charlestown, ds Dec. 6.

New York — Several fair-sized ructural jobs have been placed. verall demand is not as brisk as a w months ago but most fabricators lieve they will be able to extend okings. Much current buying is r fabrication in late winter. Fab- ators believe they will be able to tch up on arrearages rapidly as ey look for no prolonged stringency shapes. Those who have been tied , have their prestrike inventories hand and anticipate mills will be le to supply most scarce standard ctions within a short time. Shape ills are promising five to eight eeks delivery against new orders, t in various instances can do less emergency requirements.

Pittsburgh—Structural fabricators sumed operations by close of last eek. New bookings during the rike were relatively light. Most terests report large order backlogs, ade up principally of public work.

San Francisco—Ample structural ventories are reported. Resumption steel mill operations is expected relieve some prospective specialty ortages.

Seattle—Fabricators booked fair lume of small contracts for schools d industrial plants. Local plants d increasing competition from out- le sources.



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Tin Plate . . .

Tin Plate Prices, Page 140

Pittsburgh—Considerable tin pla tonnage was shipped from mill war house stocks immediately upon se tlement of the steel strike. Produce expect to resume full operating sche ules within 2 to 3 weeks. Most i terests had substantial tonnage slabs or hot-rolled coils in sto when the strike started. The supp situation in tin plate throughout t strike was aided considerably by su tained operations at Weirton a Granite City. Sellers anticipate f production schedules through Marc

Pig Iron . . .

Pig Iron Prices, Page 138

New York—Pig iron production being increased rapidly with resum tion of operations at the Troy, N. furnace the latest development. U less there is further disruption of o eration at coal mines next mont there should be ample pig iron f district foundry consumers. Mo foundries have not suffered severe from lack of iron. Most sources supply were either in operation else had extra stocks at stora yards upon which to draw in mee ing consumer requirements. Mor over, most foundries were operatin at only a modest pace; certain co sumers were able to increase the pig iron stocks. An important pic up in foundry operations may con after the turn of the year.

Boston — Foundry melt is o slightly from early fall, declin being largely within groups whi earlier registered gains, includi jobbing houses and small foundri Foundry operations among texti mill equipment builders will contin at current reduced rate throu balance of the year with outlook b yond clouded. British devaluati has exerted an adverse cost effect foreign demand for looms and oth textile mill machinery. Machine to requirements are also slow.

Philadelphia—Most pig iron co sumers have adequate supplies. Th is especially true of consumers foundry iron, some of whom are o erating at a reduced rate because a lack of new business. The small of the two furnaces at Swedelan Pa., which has been down for sever months, may resume productio around the first of the year.

Pittsburgh—Merchant pig iron pr ducers' schedules are filled throu remainder of this year. Particular heavy demand is noted from foundri serving the enamelware and radiati industries. Requirements of ing mold producers also are substantial greater than during the summ months. Jobbing foundries contin to operate an average of three da per week; those interests serving t railroad equipment field report co tinued dearth of new orders. A flur in new orders has been experienc among those foundries making cas ings relating to steel mill operation

Buffalo—One top pig iron selle who is operating at prestrike leve reports demand is taking not only of current production, but also pa of inventory; another reports lighting of one of its stacks will

layed because of slack business. e large melter with a good back- is down to two days a week be- use a customer is forced to slacken sembly work due to insufficient el supplies.

Cleveland—Merchant iron demand sluggish. Buying has not been terially stimulated by the steel ike settlement. Foundries were equately stocked throughout the rk stoppage. Casting shops are t likely to exhibit much new in- est in iron supplies until the de- nd outlook is clarified. Steel short- es are expected to hold down con- ners' castings requirements to some tent. Blast furnaces banked dur- the strike are being rapidly re- red to the active list. The wel- package cost is expected to be ssed along to consumers in higher ces once producers definitely de- mine what the cost actually is.

Cincinnati—Foundries survived the ikes without critical shortage of iron, and most of them were able get adequate supplies of coke. ncipal loss was in the slowing of stings demand. Melters would wel- ne more vigorous ordering, and ne were able to stack pig iron in es of heavier schedules.

Chicago—Demand for foundry iron good but not spectacular, majority shops having had comfortable cks before the strike. Some ob- vers think the gray iron casting ustry will operate permanently at y about the present rate of 65 to per cent of its expanded capacity.

St. Louis—Out-of-area demand for iron has dropped, but demand in local shipping territory remains ficient to absorb output. Koppers . at Granite City, Ill., has com- ted minor repairs on its B furnace d is ready to blow it in the moment tlement of the coal strike assures ady flow of coking coal.

olts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 143

Pittsburgh—With settlement of la- dispute at Oliver Iron & Steel rp. all fastener producers in this trict have resumed operations. ose interests idled by the strike t considerable business to non- uck competitors. Prior to the ike, production schedules averaged to 4 days per week and there is evidence this production pace will altered significantly over remain- of this year. It is too early to ge effect of labor contract settle- nts on production costs.

Cleveland—Industrial fastener pro- cers that operated throughout the el strike cut deeply into steel cks and anticipate delays in re- nishing inventories. October fasten- e volume in this area was heavy, flecting in part diversion of busi- ss from strikebound plants. With st strike-idled plants returned to duction, division of tonnage is re- ming normal proportions. Through- the strike, steel shortage diffi- ties of some operating plants was ieved by trades and loans of ton- ge among the separate makers. me trade interests expect higher el prices as result of the pension tlement. When the increase comes is expected fastener makers, who o face higher welfare costs, will vance their prices correspondingly.

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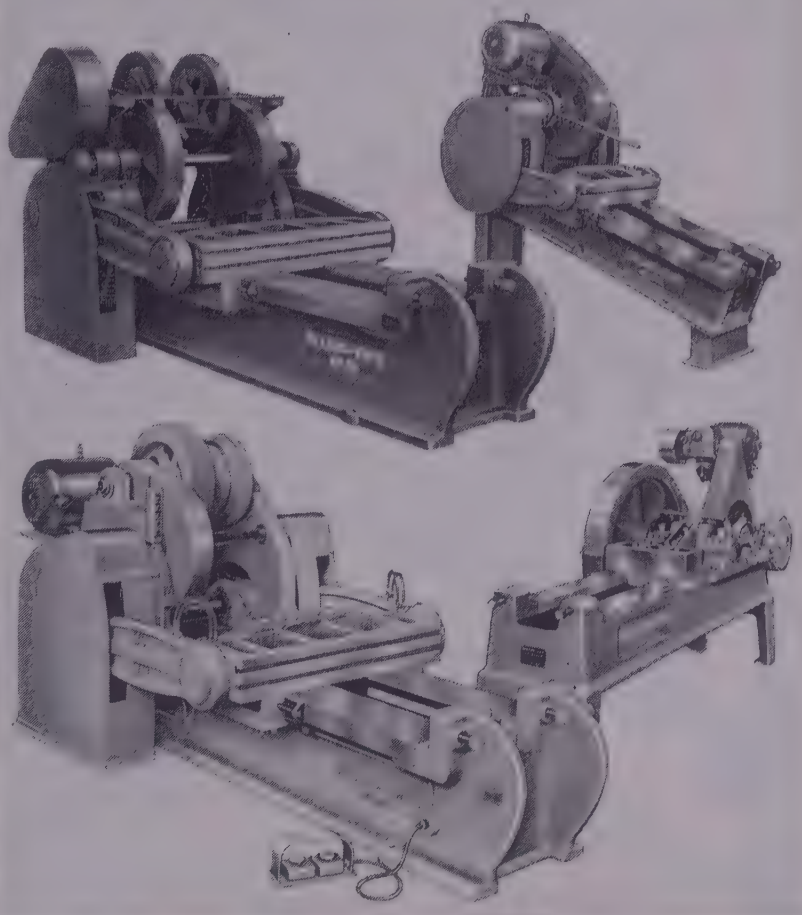

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Scrap . . .

Scrap Prices, Page 145

Pittsburgh — Mill scrap purchases have been renewed at prices representing an advance of $4 a ton for No. 1 heavy melting since end of the strike. There is evidence that dealers are willing to part with scrap at current levels. However, still higher prices are expected by traders who predict a $35 market for No. 1 heavy melting. The turnings market is up about $2. Little activity is noted for cast grades with prices unchanged.

New York—Major grades of steel scrap are strong, reflecting active demand in Pittsburgh area and increased buying in eastern Pennsylvania district. Brokers are now offering $23-$24, f.o.b. shipping point, on No. 1 heavy melting; $20-$21 on No. 2 melting and No. 1 busheling; $23-$24 on No. 1 bundles; $19 on No. 2 bundles.

Boston—Demand for steelmaking scrap is stronger and prices are higher. For both district and Pennsylvania consumers, movement of steel scrap is heavier with prices around $2 higher for some grades.

Philadelphia — District purchases have pushed No. 1 heavy melting steel prices up to $26-$27, delivered, and No. 2 heavy melting steel and No. 1 busheling up to $24.50. No. 1 bundles are higher at $26-$27 and No. 2 at $23.50. Machine shop turnings are higher at $17-$18. Bar crop and plate and punchings and plate scrap are moving against new orders at $28; cut structurals, at $27-$28. Electric furnace bundles and heavy turnings are higher at $26.00-$27.00.

In the cast grades, No. 1 cupola is stronger at $35.00-$36.00; No. 1 wheels, $38-$39.

Cleveland—Scrap market is extremely strong, based on speculative buying by brokers and dealers in the absence of mill purchases. Material is either being stockpiled or is being shipped to fill the few remaining old orders. Mills would pay $30.50 or slightly higher for No. 1 heavy melting, but are receiving offers at only substantially higher prices.

Buffalo — Prices on steelmaking grades are $2 a ton higher on sales to one leading consumer. With a number of dealers participating in the transactions, about 15,000 tons is slated to change hands. The new prices were $30 on No. 1 heavy melting, $29 on No. 2 heavy melting, and $29 on No. 1 bundles. The orders did not include turnings. With the exception of the cast market, other items reflected the strength in heavy melting. Low phos moved up to a range of $31-$32, increase of $1 to $2.

Cincinnati—Iron and steel scrap prices are higher in a renewal of buying by reactivated mills. The higher quotation are bringing out considerable tonnage that had been held by dealers on speculation. Foundry grades have moved up in sympathy despite dull demand.

St. Louis—Scrap shipments under old orders are fairly heavy. Nearly all mills, though their stockpiles are short of full winter needs, are holding up on new orders pending price developments. Heavy melting steel quotations rose $1 last week to the top of $32 on No. 1 and $27 on No. 2.

Los Angeles—Mill buying of scrap is moderate. With re-rolling rails in good demand and in short supply in this district, price has risen $7 to $8. Foundry activity has improved somewhat, and No. 1 cupola cast is up $1 to $32.

San Francisco—Steel scrap prices are holding. Suppliers, however, anticipate a rise soon. Mills have been maintaining stockpiles at average levels for several months. Now, with steelmaking higher, more active demand is foreseen.

Seattle—The $2 increase earlier this month in steel scrap has stimulated shipments beyond current needs of local mills.

Chicago—Reopened mills are slow to accept scrap contracted for before and during the strike, apparently because of rail traffic jams. By late last week, brokers and dealers were much concerned over demurrage charges on cars. Some leading interests have been able to ship only five or six carloads of scrap to date.

Detroit—Scrap prices show strength. Automotive lists for December accumulations are down sharply, only of the first being off more than 50 per cent from November. No. 2 heavy melting steel is up $2 per ton. Bundles and busheling $3; borings and turnings, $1.50; punchings and plate $3. Foundry grades are strong but unchanged.

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Warehouse . . .

Warehouse Prices, Page 143

Cleveland—Local distributors entertained a heavy volume of business over the past six to eight weeks, though in the last three weeks of the steel strike there was a noticeable letdown of pressure. Most warehouse stocks of sheets and strip have been almost depleted and it will take some time to restore inventories. Other products are more plentiful, though their stocks are unbalanced. Some gray market material is being offered.

Cincinnati—Jobbers are scraping bottom, on fast-moving items, to help out fabricators during the post-strike lag in mill shipments. Stocks are badly out of balance while the speed and tonnage of replacements are uncertain. Greatest pinch is in sheets.

Pittsburgh—Steel distributors who resumed operations last week report heavy pressure for deliveries for hot and cold-rolled sheets, galvanized sheets, wide flange beams, and carbon bars. Demand for structurals and plates is not as heavy as expected.

Philadelphia—Warehouse activity is easing, although jobbers could do more business if inventories were in better shape. One distributor has reduced cold-rolled sheet prices slightly, to be followed by at least one or two others. Hence, the current market is 6.45c city, on 15 gage and 6.20c to 6.24c, country.

Los Angeles—Warehouse activity is tilted upwards appreciably with end of the mill shutdown. Regular customers are buying steadily, reflecting greater confidence in the outlook. Distributors' inventories are low in sheet and strip, light gage plate, some sizes of nails, drill rods and tool steel.

Seattle—Demand for warehouse tonnage has slackened seasonally. Some items in short supply such as nails, are being replaced by Coast mills. Stocks generally are normal.

Chicago—Most district warehouses have low inventories. Those which were strike-bound have fairly good stocks but are under heavy pressure. Shapes, plates and sheets are virtually unobtainable

Rails, Cars . . .

Track Material Prices, Page 141

New York—New York Central closed on approximately 75,000 tons of rail, with Carnegie-Illinois Steel Corp. and Bethlehem Steel Co., sharing the major portion, and Inland Steel Co. and Algoma Steel Corp. the remainder. It is inquiring for tie plates, spikes and bolts and will shortly be in the market for frogs and switches.

Closing of bids on 5000 cars for the Union Pacific was postponed from Nov. 7 to Nov. 17, with action not probable until late in the month.

Tool Steel . . .

Tool Steel Prices, Page 141

Pittsburgh—Tool steel producers expect recent downward trend in new order volume to be reversed as result of termination of the steel strike and brighter production outlook among metalworking companies.

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Metallurgical Coke . . .

Metallurgical Coke Prices, Page 142

Cleveland — Resumption of coal mining has eased tension in the coke market, but threat of short supply continues. Should coal miners walk out again Nov. 30 the supply situation would be as bad as ever because the strike truce would be too short to permit accumulation of coal stocks sufficient to support oven operations at prestrike level for long.

Meanwhile, demand for oven coke is strong with certain foundries desperately in need of stocks. Some speculation with respect to the price trend is encountered but oven foundry coke is holding firmly in this district at $20.90, Painesville, O., ovens.

Chicago—Foundry coke is tight, but not so tight that any customer has had to close for lack of it. To make up for the loss of coke from struck steel mills, a considerable amount of domestic coke capacity has been used to make grades suitable for foundry use.

Canada . . .

Toronto, Ont.—Canadian iron and steel production in September fell well below the high average for the year, but output for the first nine months made a new all time record.

For September, pig iron output amounted to 168,436 net tons, or 74.6 per cent of rated capacity, compared with 77.2 per cent for August and 80.9 per cent for September, 1948. September output included 131,451 tons of basic pig iron, 24,705 tons of foundry iron, and 12,280 tons of malleable.

Production of ferroalloys in September amounted to 12,250 net tons and included ferrosilicon, silicomanganese, ferromanganese, ferrochrome and ferrophosphorus.

Steel ingots and castings produced in September amounted to 240,748 net tons, or a daily average of 76.3 per cent of capacity, compared with the same average for August.

Following are comparative production figures for iron and steel in net tons:

	Steel Ingots, Castings	Pig Iron	Ferroalloys
Sept., 1949 .	240,748	168,436	12,250
Aug., 1949 .	248,749	180,115	12,562
Sept., 1948 .	257,865	182,465	12,318
9 Mos., 1949.	2,404,368	1,659,003	169,534
9 Mos., 1948.	2,361,387	1,593,481	127,610
9 Mos., 1947.	2,183,564	1,466,814	112,702

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

35,000 tons, superstructure, Chesapeake Bay bridge, State Road Commission, Baltimore, formally awarded to Bethlehem Steel Co., previously noted as low bidder; in addition 4000 tons of cylinders for this project have been placed with Bethlehem; bringing the total placed with this interest, including all structure work and other requirements, up to more than 50,000 tons.

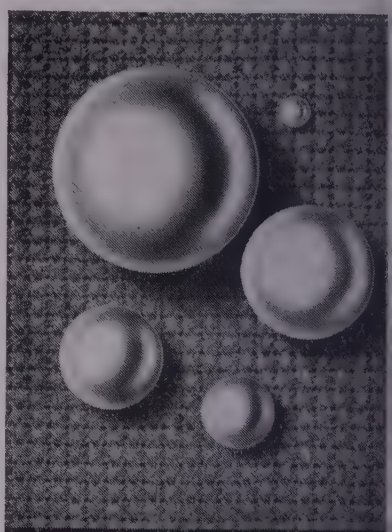
7825 tons, general assembly building and parking facilities, United Nations project, New York, to American Bridge Co., Pittsburgh.

4000 tons, brewery and storage building, Anheuser Busch Inc., Newark, N. J., through George A. Fuller & Co., New York, to Bethlehem Steel Co.

3065 tons, Veterans Hospital, Syracuse, N. Y., through John A. Johnson, Brooklyn, N. Y., Harris Structural Steel Co., New York.

1600 tons, office building, Ann and William streets, New York, to Harris Structural Steel Co., that city.

a metal ball PROBLEM?



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Strom has been making precision metal balls for over 25 years for all industry and can be a big help to you in selecting the right ball for any of your requirements. In size and spherical accuracy, perfection of surface, uniformity, and dependable physical quality, there's not a better ball made.

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STEEL BALL CO.

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) tons, housing project, South Boston, lass., to Lehigh Structural Steel Co., Allenown, Pa.; M. S. Kelliher Co., Boston, general contractor.

tons, research laboratory, Sharp & Dohme, est Point, Pa., to Bethlehem Fabricators nc., Bethlehem, Pa.; bids on general contract close Nov. 21.

tons, two 6-story apartment houses, 99th reet and 65th road, Queens, New York, to rand Iron Works Inc., that city.

tons, Tishman office addition, 67 West ith St., New York, to Lehigh Structural teel Co., Allentown, Pa.

tons, state bridge, Ulster county, New ork, to Bethlehem Steel Co.

tons, press building, *Washington Post*, Vashington, through John McShane, Philaelphia, to Bethlehem Steel Co.

tons, state highway overpass over New Haven railroad, Attleboro, Mass., to Phoenix ridge Co., Phoenixville, Pa.; Westcott Conruction Co., North Attleboro, general contractor, $269,051; bids Nov. 1.

tons, Daughters of Jacob Hospital, New ork, through HRH Construction Co., to ecker Iron Works, that city.

tons, Bell Telephone exchange, Haddonield, N. J., to Bethlehem Steel Co.

tons, addition, A. L. Smith Iron Works o., Chelsea, Mass., to American Bridge o., Pittsburgh.

STRUCTURAL STEEL PENDING

0 tons, approaches to Washington state ongview bridge; bids soon to Toll Bridge uthority, Olympia.

0 tons, two First avenue overpasses, one at 2nd street and the other at 48th street, lew York; Lynn Construction Co., low on eneral contract.

0 tons, rebuilding Sullivan Square structure, harlestown district, Boston; bids Dec. 6, tate Department of Public Works, Boston.

0 tons, school No. 14, Brooklyn, N. Y.; ids closed Nov. 15.

0 tons, also 125 tons reinforcing, bridge, hief Joseph dam, Columbia river; Guy F. tkinson Co., Seattle, apparently low, 946,620, to U. S. Engineer, Seattle.

0 tons, state highway bridges, LR763, Alleheny county, Pennsylvania; bids Dec. 21.

tons, five bridges, state highway project, eominster, Mass.; Bayer & Mingola Co., Vorcester, low on general contract, bids Nov. 15.

tons, also 25 tons reinforcing, double leaf ascule bridge, McNary dam locks; bids to U. S. Engineer, Walla Walla, Wash., Dec. 5.

tons, state turnpike bridge, 31G, Pennsylania; Latrobe Construction Co., Pittsburgh, ow on general contract.

) tons, state bridge, Lebanon county, Pennylvania; bids Dec. 2.

) tons, also unstated reinforcing, relocation railroad and state highway, Lookout Point am project, Oregon state; bids to U. S. Engineer, Portland, Dec. 22.

) tons, bridge construction, Lowell, Mass., y-pass; bids Nov. 29, state Department of Public Works, Boston.

tons, Navy communications project, Jim Creek, Washington; bids Nov. 6.

) tons, warehouse for John Deere-Linderman o., Yakima, Wash.; bids in.

tons, state highway bridge, LR258, Erie ounty, Pennsylvania; bids Dec. 9.

) tons, paper mill addition, Bellingham, Wash.; Howard S. Wright & Co., Seattle, general contractors.

REINFORCING BARS . . .

REINFORCING BARS PENDING

) tons, state highway bridges, LR763, Alegheny county, Pennsylvania; bids Dec. 21.

) tons, headquarters building Oregon Highway Commission, Salem; general contract to Sound Construction & Engineering Co., Seattle, low, $1,599,931.

) tons, two Bureau of Roads Administration bridges, Mt. Rainier national park, Washington; bids to Portland, Oreg. Nov. 29.

) tons, paper mill addition, Bellingham, Wash.; Howard S. Wright & Co., general contractors.

Unstated, two concrete slab bridges, King County, Washington; Hamilton Builders, Seattle, low $23,120.

Unstated, railroad overpass, Eugene, Oreg.; Glen Snook, Eugene, low $71,260 to Oregon Highway Commission.

PLATES . . .

PLATES PENDING

320 tons, covers for digester tanks, Portland, Oreg., sewer system project; Consolidated Western Steel Corp., Seattle, low $65,160.

PIPE . . .

CAST IRON PIPE PENDING

1200 tons, 12-inch, Metropolitan District Commission, Boston.

850 tons, 6 to 16-inch, Metropolitan District Commission, Hartford, Conn.; bids in.

Unstated, 6 and 8 inch soil pipe; bids to Bureau of Reclamation, Hungry Horse, Mont., Nov. 28.

STEEL PIPE PENDING

Unstated, 970 feet, 12 and 16 inch; bids to Tacoma, Wash., Nov. 21.

Unstated, 3 to 10 inch soil pipe; bids to Bureau of Reclamation, Hungry Horse, Mont., Nov. 28.

RAILS, CARS . . .

RAILS PLACED

New York Central, approximately 75,000 tons, awarded to Carnegie-Illinois Steel Corp., Pittsburgh; Bethlehem Steel Co., Bethlehem, Pa.; Inland Steel Co., Chicago; and Algoma Steel Corp., Sault Ste. Marie.

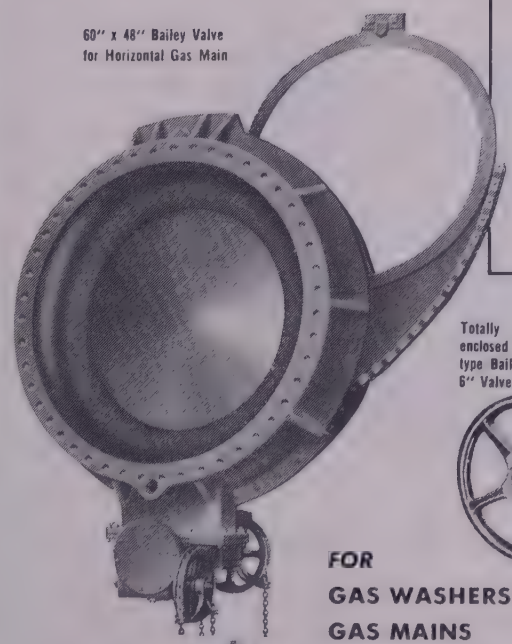
CARS PENDING

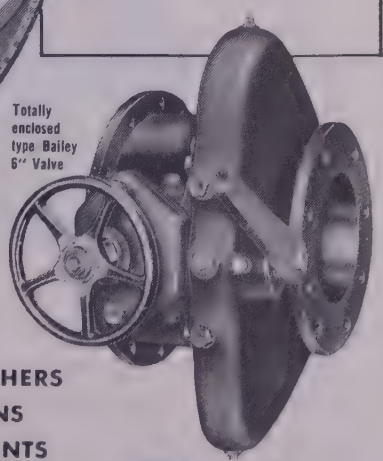
Portland Traction Co., Portland, Oreg., replacement of 27 street cars, on long term payment basis; bids to close Nov. 25; same interest plans early purchase of 32 40-passenger buses.

Safety and Dependability
REPEATEDLY PROVED IN SERVICE!
Bailey
MECHANICAL
GOGGLE VALVES
SIZES 6" TO 72"

Bailey Goggle Valves feature a powerful clamping device which assures a positive gas-tight seal when closed. In opening the Valve, the goggle plate is freed instantly by the same device.

Furnished in sizes from 6" to 72", totally enclosed if desired.





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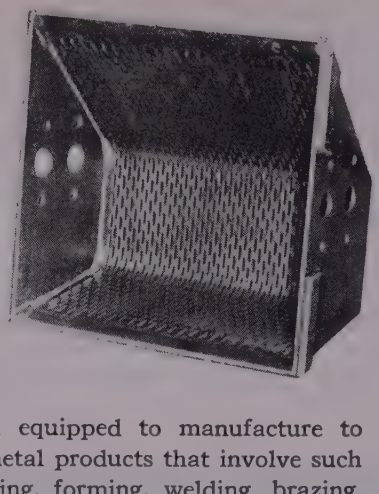

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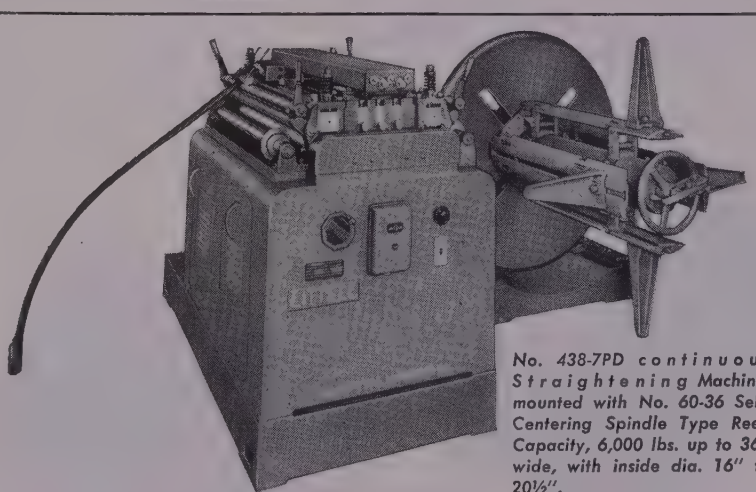

No. 438-7PD continuous Straightening Machine, mounted with No. 60-36 Self-Centering Spindle Type Reel. Capacity, 6,000 lbs. up to 36" wide, with inside dia. 16" to 20½".

Save Floor Space and Installation Time

Littell Straightening Machine complete with self-centering Reel

At last!—in one compact unit—all the equipment you need to supply heavy coils of thin stock to your presses. Littell puts a straightening machine and a reel on a common base, with the reel mounted on adjustable gibways, so that it can be set in line with the die.

Seven straightening rolls, plus two pairs of pinch rolls, flatten and straighten your heaviest and thinnest stock. Variable speed 5 h. p. drive gives 4-to-1 speed ratio, with speeds 900" to 225" per min. Electric brake on reel prevents overrunning.

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CONSTRUCTION AND ENTERPRISE

DELAWARE

NEWARK, DEL.—Delaware Power & Li Co. will construct a $65,000 substation be built on the north side of E. Main str near the existing substation which will torn down.

ILLINOIS

CALUMET CITY, ILL.—Blaw-Knox C Chemical Plants Division, has received contract from Catalin Corp. of America design and construction of a liquid re plant, located at Calumet City. The pl will have facilities for tank truck, as w as rail shipments.

LOUISIANA

OPELOUSAS, LA.—City, T. W. Huntingt mayor, will receive bids Nov. 8 for li plant addition and new engine, part of $600,000 utility project.

MARYLAND

BALTIMORE—City council has approved $1.5 million bond issue for conversion gas illumination to electric street lightir cost $4.9 million.

HAGERSTOWN, MD.—City, Herman L. Mil mayor, received bids Nov. 9 on a $1.5 m lion bond issue for electric light plant i provements.

OHIO

CLEVELAND—Standard Oil of Ohio announc plans for a $4.5 million expansion catalytic cracking facilities at Cleveland R finery No. 1. Construction plans are bei prepared by Sohio's engineering departme

CLEVELAND—Graph Metallurgical Co. Ir has been formed to deal with licenses volving metallurgical processes, etc. I corporators are L. F. Loux, H. Frank V Lill and B. Link.

CLEVELAND—Knight Machine & Tool Cor has been chartered through attorney Har A. Gillis, 809 Society for Savings Bldg., manufacture and deal in machinery, tool etc. Incorporators besides Mr. Gillis a Eugene J. Chesney and Phyllis E. Welky.

CLEVELAND—Circle Brass Co. has been i corporated by Jacob Singer, Aaron J. Ritze berg and Maurice Sing, 1010 Public Squa Bldg., to manufacture and deal in all kin of plumbing and sanitary fixtures, etc.

ELYRIA, O.—Wottring & Whidden Inc. h been incorporated to manufacture automat traffic signals. It is headed by L. Pa Wottring, John T. Whidden, 221 Brandts Ave., and Charles L. Whidden.

NEWCOMERSTOWN, O.—Heller Bros. Co. Ohio announces purchase of Majestic Trow Co. of Franklin Park, Ill., and the enti manufacturing materials and equipment ha been moved to Newcomerstown where a com plete line of trowels will be made. Irwin Gierman, owner of Majestic Trowel Co., now in charge of trowel manufacturing the Heller plant.

SALEM, O.—E. W. Bliss Co. has receiv orders for rolling mills under the Marsha Plan in the amount of $1.3 million for Ital Also, outside of the Marshall Plan, the com pany has received an order for an aluminu mill for Switzerland.

WOOSTER, O.—Work is nearing completi on an addition to the plant of Woost Brass Co. which will house the foundry. the blue print stage also is an addition the office part of the plant. John O. Schell is head of Wooster Brass.

OREGON

COOS BAY, OREG.—Union Oil Co. announc a $200,000 expansion and modernization local terminals involving additional tan and improvements to pier and pipe lines.

SALEM, OREG.—W. R. Ransom & Sons, Por land, has been awarded a state contract $234,987 for three water tube boilers, tank

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ION-FLUID OIL
TRADE MARK REGISTERED

NON-FLUID OIL does
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Works: Newark, N. J.

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bricant but is a specific
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heating and burning equipment for Salem state hospital.

TENNESSEE

OAK RIDGE, TENN.—Atomic Energy Commission announces contract for a new instrument laboratory, one of several new buildings planned for the National Laboratory. The construction and improvement program, first announced by the AEC last May, will be in excess of $10 million for the new research facilities, and more than $2 million for renovation of existing research, and facilities.

TEXAS

TEXAS CITY, TEX.—Pan American Refining Corp. has let a $250,000 contract to Tellepsen Construction Co., 1710 Telephone Rd., Houston, for a refinery building.

WASHINGTON

BELLINGHAM, WASH.—Pacific Coast Paper Mills, F. J. Herb, president, announces award of general contract to Howard S. Wright Co., Seattle, for plant additions in the second phase of a $750,000 program, involving new equipment especially for production of tissue papers.

SEATTLE—Seidelhuber Iron & Bronze Works is building a plant at Duwamish avenue and Spokane street, to replace present plant at 1421 Dearborn St. Leckenby Structural Steel Co. has contract for fabricating about 60 tons shapes for this job, also a like amount of steel for the Pacific Northwest Ford Tractor Co., Tacoma, Wash.

WALLA WALLA, WASH.—Salt Lake Pipe Line Co., subsidiary, Standard Oil, has awarded contract to Oklahoma Contracting Co., Dallas, and Grafe-Callahan Construction Co., Los Angeles, for the Boise, Idaho-Pasco, Wash., section of the petroleum pipeline. These firms have the contract for the first unit of the line from Salt Lake City to Boise, 560 miles, of the $12 million project.

CANADA

VANCOUVER, B. C.—Building permits issued in 32 British Columbia cities total $64,201,456 in the first nine months, 1949, compared with $67,692,723 in the corresponding period last year. Several important projects are pending in the area which is expected to exceed $100 million in 1949.

HAMILTON, ONT.—Pigott Construction Co. has been awarded an $800,000 contract for construction of an armory at Sault Ste. Marie. The contract was awarded by the Canadian Commercial Corp., Ottawa.

FERROALLOYS

(Concluded from Page 141)

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Contract, c.l., 8MxD, bulk 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.25c, less ton 26.0c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.03% C 31.85c per lb of contained Cr, 0.04% C 29.75c, 0.06% C 28.75c, 0.10% C 28.25c-28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lots 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 5c for each 0.25% of N above 0.75%.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract, carload, 1" x D; packed, max 0.50% C grade, $1.03 per lb of contained chromium, ton lot $1.05, less ton $1.07. Delivered. Spot, add 5c.

Silicon Alloys

25-30% Ferrosilicon: Contract, carload, lump, bulk, 17.00c per lb of contained Si; packed 18.40c; ton lot 19.50c., f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

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By leasing Air Products generators and making your own oxygen from air, you can assure yourself a continuous supply—with no investment for equipment. Air Products generators extract your oxygen from the air and feed it right to your pipe line without handling.

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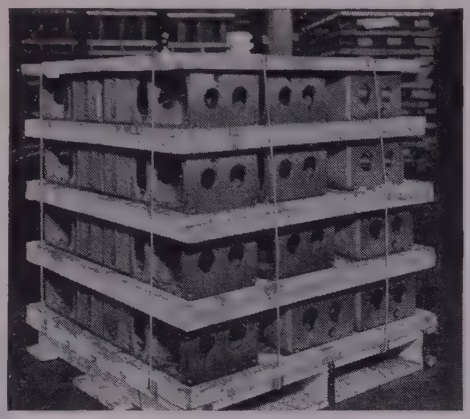
Transmission cases securely bound to pallet with Gerrard 10 gauge Round Steel Straps. (Photo by International Harvester Co., Industrial Power Division.)



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The use of Gerrard Round Steel Strapping will cut your material costs 30 to 50 percent.

The simplicity of Gerrard Steel Strapping operations will speed up binding and packaging procedures. Every Gerrard machine tensions the strapping, forms its own twisted seal, trimmed smooth with no exposed ends.

And the Gerrard method gives unrivalled protection. Packages are securely bound into rigid, pilferproof bundles. In crates, cartons, palletized loads, and carload lots of steel pipe, sheets and machinery, torsional sway is practically eliminated and damage claims are sharply reduced.

Gerrard Round Steel Straps come in a wide range of gauges to satisfy every commercial and industrial need. Gerrard Engineers will gladly help you solve your packaging problems. Their services are available *free of charge.* Write for our free books, *Blue Book of Packaging* and *Red Book of Carload Stowage.*

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THE BIG BRUTE

.... the press for heavy duty

The Thomas 8A Back-Geared Press is the Big Brute of the Thomas O.B.I. line. Its extremely rigid construction, with plenty of weight where weight is needed makes it the ideal heavy duty machine for producing the heavier type of stampings, *with greater accuracy* and *less die wear.*

MODEL 8A

- *Rated Capacity, 106 tons*
- *Shut Height, 18"*
- *Bolster Area, 30" by 42"*
- *25,000 lbs. of useful weight*

THOMAS
MACHINE MANUFACTURING COMPANY
PITTSBURGH, 23 PA.

Write for Bulletin 212A

P-5 PUNCHES • SHEARS • PRESSES • BENDERS • SPACING TABLES

50% Ferrosilicon: Contract, carload, lu bulk, 11.3c per lb of contained Si, car packed 12.9c, ton lot 14.35c, less ton Delivered. Spot, add 0.45c.
Low-Aluminum 50% Ferrosilicon: (Al 0. max.) Add 1.3c to 50% ferrosilicon pri

75% Ferrosilicon: Contract, carload, lu bulk, 13.5c per lb of contained Si, car packed 14.8c, ton lot 15.95c, less ton 1 Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lu bulk, 14.65-15.00c per lb of contained Si, load packed 15.9c, ton lot 16.9c, less 18.05c. Delivered. Spot, add 0.25c.
Low-Aluminum 85% Ferrosilicon: (Al 0. max.). Add 0.7c to 85% ferrosilicon pri

90-95% Ferrosilicon: Contract, carload, lu bulk, 16.5c per lb of contained Si, car packed 17.7c, ton lot 18.65c, less ton 1 Delivered. Spot, add 0.25c.
Low-Aluminum 90-95% Ferrosilicon: (Al 0. max.). Add 0.7c to above 90-95% ferrosil prices.

Silicon Metal: (Min. 97% Si and 1% m Fe). C.l., lump, bulk, regular 19.0c pe of Si, c.l. packed 20.2c, ton lot 21.1c, less 22.1c. Add 1.5c for max. 0.10% calc grade. Deduct 0.4c for max. 2% Fe g analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Contract, basis f.o.b. Niagara Falls, N. lump, carload, bulk, 7.40c per lb of al ton lots packed 8.80c, 200 to 1999 lb 9. smaller lots 9.65c. Delivered. Spot up

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3 each and containing exactly 2 lb of Cr). tract, carload, bulk, 13.75c per lb of briq carload packed 14.45c, ton lot 15.25c, less 16.15c. Delivered. Add 0.25c for notch Spot, add 0.25c.

Ferromanganese Briquets: (Weighing app 3 lb and containing exactly 2 lb of Contract, carload, bulk 10.45c per lb briquet, c.l. packaged 11.25c, ton lot 12. less ton 12.45c. Delivered. Add 0.25c notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing app 3½ lb and containing exactly 2 lb of Mn approx. ½ lb of Si). Contract, c.l. bulk 10. per lb of briquet, c.l. packaged 11.1c, ton 11.9c, less ton 12.8c. Delivered. Add for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing prox. 5 lb and containing exactly 2 lb of Contract, carload, bulk 6.15c per lb of briq c.l. packed 6.95c, ton lot 7.75c, less ton 8 Delivered. Spot, add 0.25c.

(Small size—weighing approx. 2½ lb and taining exactly 1 lb of Si). Carload, 6.30c; c.l. packed 7.10c, ton lots 7.90c, less 8.80c. Delivered. Add 0.25c for notching, s size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ Mo. each) 95.00c per pound of Mo conta F.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, 14-18% and Si 53-59%. Contract, carl lump, bulk 19.25c per lb of alloy, car packed 20.05c, ton lot 21.55c, less ton 22. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, 1.50-3%). Contract, carload, lump, bulk per lb of alloy, carload packed 19.1c, ton 21.0c, less ton 22.5c. Delivered. Spot 0.25c.

Titanium Alloys

Ferrotitanium, Low-Carbon: (Ti 20-25%, 3.5% max., Si 4% max., C 0.10% m Contract, ton lots 2" x D, $1.40 per lb contained Ti; less ton $1.45. (Ti 38-43% 8% max., Si 4% max., C 0.10% max.) lot $1.28, less ton $1.35, f.o.b. Niagara F N. Y., freight allowed to St. Louis. Spot, 5c.

Ferrotitanium, High-Carbon: (Ti 15-18% 6-8%). Contract $160 per net ton, f.o.b. agara Falls, N. Y., freight allowed to dest tion east of Mississippi river and north Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21% 3-4.5%. Contract, $175 per ton, f.o.b. gara Falls, N. Y., freight not exceeding Louis rate allowed.

Vanadium Alloys

Ferrovanadium: Open-Hearth Grade (Va 55%, Si 8-12% max., C 3-3.5% max.) tract, any quantity, $2.90 per lb of conta Va. Delivered. Spot, add 10c. Crucible-Sp

At 9 out of 10 of the largest and most important decision points in American industrial purchasing, MacRAE'S BLUE BOOK is used as a reference source "principally" or "exclusively."

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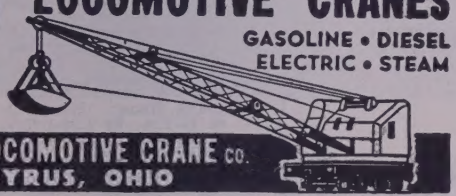

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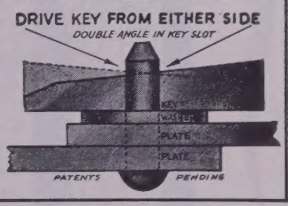

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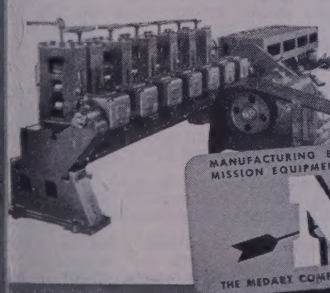

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PLEASING, CLEAN-CUT APPEARANCE, SERVICEABLE, *READY-MADE...*

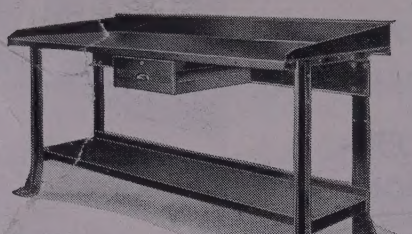

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Fig. 732
Pat'd Pats. Pend.
Drawer is extra

WORK BENCHES OF STEEL

These *ready-made,* serviceable "HALLOWELL" Work Benches of Steel have a pleasing, clean-cut appearance, and are ideal equipment for modernizing *your* shop. They are made in an assortment of standardized heights, widths and lengths, and the "HALLOWELL" Units can be used either individually or bolted together to form a continuous work bench of any desired length—this flexibility is a great money-saving feature *not practicable* with "nailed-together" wooden benches. "HALLOWELL" Benches have smooth, long-wearing steel tops; are also available with heavy, high-grade laminated wood tops . . . or steel tops covered with "Tempered Presdwood". The "HALLOWELL"—rigid as a rock—*does not* require costly bolting to the floor.

Other "HALLOWELL" Products include:
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In the heart of Pittsburgh's Golden Triangle . . . near the important office buildings, stores and theatres.

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Grades (Va 35-55%, Si 2-3.5% max., C 1% max.), $3. **Primos and High Speed Gr** (Va 35-55%, Si 1.50% max., C 0.20% m $3.10.

Grainal: Vanadium Grainal No. 1, 93c; N 63c; No. 79, 45c, freight allowed.

Vanadium Oxide: Contract, less carload $1.20 per lb of contained V_2O_5, freight lowed. Spot, add 5c.

Tungsten Alloys

Ferrotungsten: (70-80%). Contract, 10,0 W or more, $2.25 per lb of contained 2000 lb W to 10,000 lb W, $2.35; less 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Con or spot, 1000 lb or more, $2.90 per lb of tained W; less than 1000 lb W, $3.

Zirconium Alloys

12-15% Zirconium Alloys: (Zr 12-15%, Si 43%, Fe 40-45%, C 0.20% max.). Cont c.l., lump, bulk 6.6c per lb of alloy, c.l. pa 7.35c, ton lot 8.1c, less ton 8.95c. Deliv Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 52%, Fe 8-12%, C 0.50% max.). Cont carload, lump, packed 20.25c per lb of a ton lot 21c, less ton 22.25c. Freight all Spot, add 0.25c.

Boron Alloys

Ferroboron: (B 17.50% min., Si 1.50% m Al 0.50% max., C 0.50% max.). Cont 100 lb or more, 1" x D, $1.20 per lb o loy. Less than 100 lb $1.30. Delivered. add 5c. F.o.b. Washington, Pa., prices lb and over are as follows: Grade A 14% B) 75c per pound; Grade B (14-18% $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $4.25 lb contained B, f.o.b. Philo, O., with fr not to exceed railroad freight allowed to tination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net to carload, 8c per lb, f.o.b. Suspension Br N. Y., freight allowed same as high-ca ferrotitanium.

Other Ferroalloys

Ferrocolumbium: (Cb 50-60%, Mn 5% m Si 8% max., C 0.5% max.). Contract, ton 2" x D, $2.90 per lb of contained Cb, less $2.95. Delivered. Spot, add 25c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4 Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 1.25%, C 3.50-5%). Carload, 12 M x D, load packed 19.0c per lb of material, ton 19.75c, less ton 21.0c. Delivered.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6 Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Car packed. 1" x D, 43c per lb of alloy, lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5 Fe 20% approx.). Contract, carload, pac ½" x 12 M, 16.5c per lb of alloy, ton 17.50c, less ton 18.5c. Delivered. Spot, 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, 11%). C.l. packed, 17.00c per lb of alloy; lots 18.00c; less ton lots 19.50c, f.o.b. Nia Falls, N. Y.; freight allowed to St. Louis

V-5 Foundry Alloy: (Cr 38-42%, Si 17-1 Mn 8-11%). C.l. packed, 14.25c per lb alloy; ton lots 15.75c; less ton lots 17. f.o.b., Niagara Falls, N. Y.; freight allo to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Lump, bulk, carload 11.00c. Ton lots, 11.50c, packed 11.75c. Less ton lots, pa 12.25c per lb of alloy, f.o.b. Philo, O., freight not to exceed railroad freight allo to destination.

Ferrophosphorus (23-25% based on 24% P tent with unitage of $3 for each 1% above or below the base); Gross tons per load, f.o.b. seller's works, Mt. Pleasant Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, tained Mo, f.o.b. Langeloth and Washing Pa., furnace, any quantity $1.10.

Technical Molybdic-Oxide: Per lb, conta Mo., f.o.b. Langeloth and Washington, packed in bags containing 20 lb of m denum, 95.00c.

024-10-01

Why B. F. Goodrich water hose lasts up to 100% longer

Low water absorption, high "wet strength" cord, add years of life

B. F. GOODRICH water hose is made with rubber compounds that make it highly resistant to water absorption, swelling, carcass damage.

In accelerated laboratory tests B. F. Goodrich water hose absorbed less than half as much water as other brands tested. This means longer hose life, because water can diffuse through to the carcass to cause mildew and mold.

All types of B. F. Goodrich water hose have this longer-lived compound. And all types have "wet strength" cord — specially treated long-staple cotton that actually becomes *stronger* when wetted (where synthetic fibers weaken).

Tubes—All grades and types of B. F. Goodrich water hose are fortified with Agerite, the chemical that makes rubber last longer. Most BFG water hose stands hot water; some—creamery hose for example—even take low pressure steam. Specially compounded tubes available to stand water contaminated with acids and other chemicals.

Covers—You can drag B. F. Goodrich water hose over wet concrete floors, dirt and cinder yards, use it on highways where it gets run over. It's compounded to take severe abrasion, to resist cutting and gouging. Some covers are compounded to stand oils and greases. Can be made with rubber-capped ends, that protect the carcass from moisture wicking in. Built-in nozzles and tapered ends can be dropped anywhere without doing damage.

If you use water hose don't be satisfied without knowing what developments BFG may have made in hose for your particular type of service. To make sure you get the longest life from water hose, see your local BFG distributor. *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Water Hose BY

B.F.Goodrich

Behind the Scenes...

Feel Better?

Regarless of what your own P & L statement may look like so far this year and even though you may have just had to borrow a couple of bucks from your secretary to see you through lunch, you should this week go about your duties with a big broad smile on your face and be tickled pink that things are so wonderful. This, dear friend, is National Prosperity Week and whether you are flat broke or not you're supposed to look, act and feel prosperous —or the Christmas Club people won't like it.

Great To Be Young

Last week our fellow Shrdlu, Mr. McKinney of Albany, N. Y., seemed at least mildly interested in how old we are and although it is one of those things that is pretty much taken care of by itself, we're willing to make an admission. We just celebrated our 8th birthday, and we don't mean this column. Last night our younger daughter threw a party at our house for sixteen of her eight-year old friends and Daddy was right in there pitching for all he was worth, which, as the little woman will tell you is a difficult thing to measure. All joking aside, if you haven't recently had the opportunity to revert back to the life of an eight-year old you don't know what fun you're missing. You will rediscover some of the finest things in life—sheer happiness, pure love, unadulterated friendliness, refreshing innocence, contagious excitement, and boundless joy. We will have to admit that after packing them all (and we do mean all) into the station wagon and delivering them one by one to their respective homes, we felt a lot tireder than any healthy eight-year old should. Also it was quite a shock to discover that the locusts had apparently not left a scrap of food in the Shrdlu domicile except what was ground into the carpet or stuffed behind the draperies, so after taking the broken chair and glasses down to the basement both Mommy and Daddy had what is referred to vulgarly as a quick snort and headed down to the local hamburger joint for a cheeseburger with the works. Ah, to be eight again!

Pension Guides Available

It looks like this problem of pensions is going to be with us for a long time to come and if you're one of the medium size or smaller companies don't think for a minute it isn't something that will catch up with you soon. So, just in case you missed Walter Campbell's special advice to smaller companies on **Puzzling Pension Problems** we suggest you let us know and we'll be glad to sent you a reprint of this concise two-page article which will give you some helpful hints on procedure.

Something New Brewing

We took a little stroll up to the ninth floor the other day to see what the editors were doing on the Yearbook issue, which is slated for January 2, 1950. Apparently our timing was all wet because we were practically thrown out of the editorial precincts. All we can say now is that they're doing plenty, but it's all under wraps for the present. "We've got something new", they say, and if you'll just be patient, we'll pry some of the details loose and pass them along to you in another week or so.

Puzzle Corner

Now that Thanksgiving is under our belts, literally and figuratively, we'll let you in on the answer to that puzzler about the trouble-maker whom the boss wanted to end up turkeyless. He cheated him out of a turkey by starting the counting with the third person to the left of him, and counting clockwise.

Now—are you ready to go slightly batty? Okey, tackle this: A perfectly flexible rope hangs over a frictionless pulley. A weight is tied to one end and at the other end hangs a monkey of equal weight. The rope weighs four ounces per foot. The combined ages of the monkey and its mother equal four years, and the weight of the monkey is as many pounds as the mother's age. The mother is twice as old as the monkey was when the mother was half as old as the monkey will be when the monkey is three times as old as its mother was when she was three times as old as the monkey was. The weight of the rope plus the weight is half as much again as the difference between the weight of the weight and the weight of the weight and the weight of the monkey. The question is: How long is the rope?

Shrdlu

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STEEL

Vol. 125—No. 18 November 28, 1949

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Published every Monday. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $10; two years $15; all other countries, one year $18. Single copies (curent issues) 35c. Entered as second class matter at the postoffice at Cleveland, under the Act of March 3, 1879. Copyright 1949 by the Penton Publishing Company.

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